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REVIEW OF APPLIED MYCOLOGY

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STEWART (D. M.). **Factors affecting local control of White Pine blister rust in Minnesota.**—*J. For.*, **55**, 11, pp. 832–837, 2 fig., 3 graphs, 1957.

In attempts to control blister rust (*Cronartium ribicola*) [**35**, p. 336; **37**, p. 189] on white pine (*Pinus strobus*) eradication of *Ribes* was unsuccessful in an area planted 1–2 years after a fire, but successful in an area planted 26 years after burning. A better alternative for young planted trees was removal of cankers, either (1) by cutting off branches cankered 6 in. or more from the trunk, (2) additionally excising bark round the branch stub if the canker was nearer the trunk, and (3) lopping off cankered tree tops. Examination 6 years after such pruning indicated that 100% of the trees branch-pruned, 69–100% with branch-trunk pruning scars, and 95% of those top-pruned were canker-free. Canker elimination was attempted on natural forest trees by removal of diseased limbs, or alternatively by removal of all lower branches and those cankered in the upper 5 whorls. The latter proved more effective but impracticable as a forest operation.

LEAPHART (C. D.), COPELAND (O. L.), & GRAHAM (D. P.). **Pole blight of Western White Pine.**—*For. Pest. Leafl. U.S.D.A.* 16, 4 pp., 2 fig., 1957.

The author reviews the importance and geographical distribution of pole blight of western white pine (*Pinus monticola*) [**36**, p. 148], known since 1929, which is found in northern Idaho and adjacent parts of Montana and Washington, and extends into British Columbia, including Vancouver island [see below]. About 95,000 acres ($\frac{1}{8}$ of the pole-size *P. monticola*) are damaged by pole blight and damage up to 81% of the basal area occurred. In lightly damaged stands with disease of more recent origin 10–53% of the basal area is affected. The symptoms are described and possible causes under investigation are outlined.

FOSTER (R. E.). **Pole blight of Western White Pine.**—*Timb. Can.*, Sept., 4 pp., 7 fig., 1957.

The occurrence of this disease [see above], which is reviewed, was 1st confirmed in British Columbia in 1948. Experimental studies are outlined; they include investigations of bark lesions, of the silvicultural requirements of *P. monticola*, including its rooting habits, and of the progress of the disease in stands subject to various treatments in comparison with those untreated.

WRIGHT (E.). **Cytospora canker of Rocky Mountain Douglas-fir.**—*Plant Dis. Reptr*, **41**, 9, pp. 811–813, 3 fig., 1957.

Cytospora [*Valsa*] *kunzei* [**35**, p. 564], associated with pitch-girdle canker of *Pseudotsuga menziesii* near Sedalia, Colorado, produced typical cankers on wound-inoculated trees. The fungus grew better under thin bark than under thick. Cankers were occasionally found on isolated trees growing on poor soil where periods of drought would cause a lowering of resistance, and it is suggested that the less common occurrence of the disease of recent years is associated with the more normal rainfall in the eastern Rocky Mountains following a period of deficiency.

ENGELHARDT (N. T.). **Pathological deterioration of Looper-killed Western Hemlock on southern Vancouver Island.**—*For. Sci.*, **3**, 2, pp. 125–136, 5 fig., 2 graphs, 1 map, 1957.

Much of this information on the deterioration of *Tsuga heterophylla* after severe infestation by *Lambdina fiscellaria lugubrosa* has already been noticed [**34**, p. 196]. *Fomes pinicola* caused 230 out of a total of 413 infections studied.

Abies amabilis deteriorated as rapidly as hemlock, Douglas fir (*Pseudotsuga menziesii*) was considerably more durable, and Sitka spruce (*Picea sitchensis*) was intermediate [cf. **8**, p. 540; **19**, p. 445; **23**, p. 202].

Scaramuzzi (G.) & Ciferri (R.). **Una nuova virosi: la 'maculatura lineare' nel Nocciolo.** [A new virosis: line-pattern of Hazel-Nut trees.]—*Ann. Sper. agr.*, N.S., **11**, 6, *Suppl.*, pp. lxi–lxxii, 1 col. pl., 5 fig., 1957. [English summary.]

Corylus avellana trees in the Province of Bari, Italy, have developed a line-pattern on the leaves. Long, irregular, yellowish or pale green areas, variously disposed but generally between the veins, are often accompanied on the same leaf by flecking, ring spot, or veinbanding. The fruits and branches appear to remain unaffected. The virus nature of the condition was demonstrated by its transmission to healthy young hazel shoots by chip-budding, as described by Cropley [**35**, p. 22]. This appears to be the first record of a virus disease affecting hazel.

Graniti (A.). **Risultati di inoculazioni artificiali con ceppi di Cytospora corylicola Sacc., isolati da Noccioli colpiti da mal dello stacco in Sicilia.** [The results of artificial inoculations with strains of *Cytospora corylicola* Sacc. isolated from Hazel Nut trees affected with bark flaking disease in Sicily.]—*Ital. for. mont.*, **12**, 2, pp. 93–98, 10 fig., 1957. [French summary.]

Experimental inoculations of hazel nut trees (*Corylus avellana*) growing on the slopes of Mount Etna, Sicily, with strains of *Cytospora corylicola*, constantly associated with bark flaking disease of this host [**32**, p. 286], in all cases failed to reproduce the condition. It is concluded that the fungus is a secondary parasite.

Cowling (E. B.). **A partial list of fungi associated with decay of wood products in the United States.**—*Plant Dis. Reptr*, **41**, 10, pp. 894–896, 1957.

This tabulation, compiled by the Division of Wood Preservation, Forest Products Laboratory, Madison, Wisconsin, from the literature, indicates the type of wood and wood product and kind of decay associated with each of some 98 spp. of fungi.

Baechler (R. H.). **Materials of construction. Wood.**—*Industr. Engng Chem.*, **48**, 9, pp. 1798–1801, 1956. [97 refs. Received 1957.]

This review from the Forest Products Laboratory, Madison, Wisconsin, covers developments in wood products during Apr. 1954–Apr. 1956 and includes a section on preservatives and protective treatment [**36**, p. 740].

Meyers (S. P.) & Reynolds (E. S.). **Incidence of marine fungi in relation to wood borer attack.**—*Science*, **126**, 3280, p. 969, 1957.

From the Marine Laboratory, University of Miami, Florida, the authors report a 5-year study of the distribution of marine fungi at numerous stations in N. America and also in the Caribbean area, the Gulf of Mexico, and the Canal Zone. Fungal attack occurred on submerged wood samples at all the stations, *Lulworthia* and *Helicoma* spp. [cf. **31**, p. 301] being extremely abundant. During winter in the boreal and N. temperate areas, when borer activity was negligible, there was vigorous fungal attack; in the subtropics the period of attack prior to borer infestation was shorter. It is concluded that when borers commence their activities in spring the wood which they attack is thoroughly infected by fungi [cf. **34**, p. 198].

Clark (J. W.). **A gray non-fungus seasoning discoloration of certain red Oaks.**—*Sth. Lumberm.*, **197**, 2418, pp. 35–38, 1 fig., 1956. [Received Dec. 1957.]

From the Forest Products Laboratory, Madison, Wisconsin, the author describes investigation of a light to dark grey stain of the sapwood in lumber of red oak spp. developing during air drying, and found mainly in the southern hardwood

areas. The discoloration resembles ordinary blue or sap stain but has a grey coat with tinges of brown and a more uniform distribution. It would seem to be caused by the presence in the wood of an oxidizing enzyme which is destroyed or inactivated by heat.

Öhlmann (J.). **Holzschutz im Bergbau (II).** [Timber preservation in the mining industry (II).]—*Bergbautech.*, 7, 3, pp. 155–160, 11 fig., 2 graphs, 1957.

The present paper [cf. **36**, p. 292] deals with methods of preserving above-ground timbers.

Kilroe-Smith (T. A.). **Studies in the metabolism of fungi. Part I. A cellulolytic enzyme preparation from Hydnum henningsii (Bres.).**—*J. S. Afr. chem. Inst.*, **10**, 1, pp. 29–35, 3 graphs, 1957. [Afrikaans summary.]

At the Transvaal and Orange Free State Chamber of Mines, Johannesburg, a preliminary survey was made of the occurrence of some common enzyme systems in malt agar cultures of 2 of the most important lignicolous fungi of the Witwatersrand gold mines, *Polyporus rugulosus* and *H. henningsii*, the former representing the 'white rot' or lignin-destroying group and the latter the 'brown rot' or cellulose-destroying.

A cellulolytic enzyme concentrate was prepared from cultures of *H. henningsii* grown for 9 months on *Eucalyptus saligna* sapwood and some of its properties were studied. It was rapidly inactivated above 50° C. and above pH 6. On reprecipitated cellulose activity reached a peak at pH 3 and 37°. The main hydrolysis product of cellulose is glucose, but a small amount of cellobiose was also detected.

Ziegler (H.) & Lau (Gabriele). **Ein Schnelltest zur Identifizierung von Merulius-Arten.** [A rapid test for the identification of *Merulius* species.]—*Naturwissenschaften*, **45**, 2, pp. 45–46, 1 fig., 1958.

At the Forstbotanisches Institut der Forstlichen Forschungsanstalt, Münich, Germany, mycelia of *M. lacrymans* var. *domesticus* [*M. lacrymans*] and *M. silvester* [7, p. 292], whether cultured on malt agar or procured in a living condition from dwelling-houses, produced characteristic water-soluble substances fluorescing greenish-blue and blue, respectively, in ultra-violet light. The R_F value of the 2 substances was shown by paper-chromatographic analysis to be identical (0·41) and both migrate in a cathodic direction at an equal rate, but their absorption spectra were not the same. The fluorescent substances from the 2 *M.* spp. were readily separable by electrophoresis from others fluorescing in ultra-violet light, e.g. amino acids. Aqueous extracts from mycelia of *M. lacrymans* that have been dead for a considerable period yield a similar fluorescent material, the R_F value of which, however, is 0·85 and the direction of its course anodic.

Since the substances in question are not produced by other common wood rotting fungi their occurrence affords a reliable means for the diagnosis of *M.* spp.

Khrenova (Mme G. S.). **The physiological and pro-chemical characteristics of 'house' fungi.**—*Trud. In-ta biol. Uralsk. fil. ANSSR*, **5**, pp. 111–118, 1954. [Abs. from English translation of *Referat Zh. Biol., 1956*, 7, p. 53, 1957.]

From a study on the nutrition of *Serpula* [*Merulius*] *lacrymans*, *Coniophora cerebella* [*C. puteana*], and *Coriolus vaporarius* [*Poria vaporaria*] it was established that the best sources of N for all the fungi were peptone and $(NH_4)_2HPO_4$ followed by NH_4NO_3, KNO_3, $(NH_4)_2SO_4$, and $NaNO_3$. Glucose was best utilized of the C sources. With KNO_3 as the N source only *P. vaporaria* was unable to utilize mannite and only *M. lacrymans* could not utilize ethyl alcohol, whereas only *C. puteana* utilized starch. Accordingly the method of using different C sources can serve in identification.

MANGENOT (F.). **Acidité ionique et populations fongiques des bois. II. Influence des conditions de culture sur la croissance et la synthèse des acides humiques.** [Ionic acidity and fungal populations of timbers. II. The influence of cultural conditions on the growth and synthesis of humic acids.]—*Rev. gén. Bot.*, **64**, 766, pp. 670–677, 1957.

Continuing his earlier studies [**33**, p. 395] the author grew 11 species of lignicolous fungi on a medium in which nitrate N was replaced by an equivalent amount of amino N as asparagine, the cultures being made on 10 ml. of medium in Erlenmeyer flasks of 150 ml. capacity. It was found that under these new experimental conditions in which the cultures were well-aerated growth was better and more uniform. Experiments showed that *Stachybotrys atra* does not produce humic acids in culture and that certain fungi are able to form measurable amounts of materials in addition to humic acids in an acid medium the final pH value of which is under 4·6.

TIITANEN (E.). **Development of wood preservation in Finland.**—*Finn. Pap. Timb. J.*, N.S., **8**, 5, pp. 70–71, 3 fig., 1957.

Although the inception of timber preservation in Finland [cf. **34**, p. 418 *et passim*] dates back to 1904, when 2 large pressure impregnation plants were established by the State Railways, large-scale operations by electricity companies were not begun until the 'thirties. After the 2nd world war rapid progress was made and at present there are some 66 plants, of which 20 are commercial while the rest are operated mainly by communal or provincial electricity companies.

In 1949 the total volume of treated timber was 80,000 cu. m.; since that date a steady rise brought the figure for 1956 to 206,000 cu. m. Salts (mostly K 33) were applied to 114,900 cu. m. of the timber treated in 1956 and creosote to 90,757. The paper concludes with a note on the activities of the Finnish Wood Preservation Association.

GADD (O.). **Wood decay resulting from rot fungi.**—*Paperi ja Puu*, **39**, 8, pp. 363–364, 366, 368–369, 372–374, 5 fig., 1957. [Finnish summary. 23 refs.]

Wood decay is stated to cause an estimated loss of 1,750,000 cu. m. per annum in Finland. At the Pulp and Paper Research Institute, Helsinki, the author investigated by means of paper chromatography the reactions of the phenolase enzymes of *Trametes* [*Fomes*] *pini* and *Polyporus* [*Polystictus*] *abietinus*, cultured on 1% malt extract solution with vanillin and other monomeric aromatic compounds found during the breakdown of lignin. The main function of the enzymes appeared to be the polymerization and oxidation of anti-fungal compounds. For instance, vanillin was transformed to catechol and guaiacol to tetraguaic quinone, the occurrence of which in rotted wood was demonstrated. *Coniophora cerebella* [*C. puteana*] proved to be particularly sensitive to the aromatic compounds.

CONKEY (J. H.) & CARLSON (J. A.). **Relative toxicity of disinfectants available for use in the pulp and paper industry. 1955 and 1956 supplements.**—Reprinted from *T.A.P.P.I.*, **39**, 12, pp. 32A, 34A, 1956. [Received Oct. 1957.]

In further studies at the Institute of Paper Chemistry, 42 compounds were examined as before [cf. **33**, p. 370]. The results are tabulated.

Plant pathology division.—*Res. & exp. Rec. Minist. Agric. Nth. Ireland*, **6** (*1956*), pp. 158–181, 1957.

In this report [cf. **37**, p. 3] *Fusarium culmorum*, *F. sambucinum*, and *F. tricinctum* are recorded as causing occasional rots of potato tubers. The greater prevalence of rots caused by *F. caeruleum* is thought to be related to its more frequent occur-

rence in the field (probably augmented by lack of crop rotation) and ability to infect tubers under conditions of low humidity. Five isolates of *F. avenaceum* from seed oats were pathogenic to potato tubers. *F. caeruleum* is easily spread by a knife and may also enter the tuber through common scab [*Streptomyces scabies*] lesions. In general, susceptibility to dry rot increases with age and is unaffected by slight variations in the storage temp.

During further observations on the spread of potato virus Y it was noticed that the symptom picture varied considerably between the varieties studied. Arran Pilot, though not displaying leaf drop streak in the 1st year, exhibited conspicuous symptoms of rugose mosaic at this stage, as did plants in later years of infection. Home Guard developed veinal necrosis following 1st year infection, but in the 2nd year diseased plants were not so easily recognized. In Arran Victory a slight mottling and hardening of the foliage together with a tendency to a sprawling habit occurred, but this variety, like Ulster Chieftain, had no definite symptoms of current year infection. The only symptom in 2nd year plants of Ulster Chieftain was a slight rugosity. The reactions are given of 28 varieties in the 1st and 2nd year following infection with virus Y both naturally in the field and by grafting.

An antiserum has been prepared which gave satisfactory results, at 1:10, in testing for potato virus S by the agglutination method. The serological activity of this virus disappeared when infected sap was heated for 10 min. at 53° C. or above. Potato leaf samples can be safely stored in a refrigerator for up to 3 months without prejudice to the results obtained in sap inoculation tests for the presence of virus X.

Following the development of suitable techniques for testing flax for resistance to stem break (*Polyspora lini*) [**36**, p. 698] it was found that the disease develops equally well after inoculation at any stage from the first appearance of the foliage leaves as a slight protuberance between the cotyledons until at least 4 are just visible; if inoculated in the open at 13–15°, plants develop severe attacks. The standard pot technique permits a fairly accurate estimate of resistance, but is more severe than field tests. Study of the effect of temp. on *Colletotrichum linicola* [**35**, p. 153] has shown that while serious attacks may occur over a wide range seedlings are killed more quickly at fairly high temps. Plants grown in soil inoculated with *Phoma* sp. [loc. cit.] on flax straw developed characteristic symptoms with pycnidia in profusion.

In experiments on the effect of nutrition in relation to club root (*Plasmodiophora brassicae*) [**37**, p. 192] the disease index fell as the dosage of ammonium sulphate +superphosphate was increased. High levels of N and P were associated with the least severe attacks, K having the opposite effect. Plants grown in a very deficient compost can be infected readily, but have smaller 'clubs' than with a complete nutrient. The effects of treatments given after transplanting may be substantially influenced by the nutrition of the seedlings.

Further spraying tests for the control of rose rust (*Phragmidium mucronatum*) [**35**, p. 153] were started on 17 Apr. The first aecidia were observed in 2 of the unsprayed plots on 18 May. The results, expressed as a mean of the disease indices for all 4 varieties tested were: oil-Bordeaux in Apr. and May followed by tulisan from June to Sept., 4·6; fermate, 4·8; fermate+spersul, 10; tulisan, 14; spersul, 14·9; obetan, 17·5; tulisan alternating with captan, 19·8; captan, 45·6; and the unsprayed, 81·3 and 92. Captan was also tested against black spot (*Actinonema* [*Diplocarpon*] *rosae*) [**36**, p. 452]; the results indicated the necessity for spraying before the disease appears and the increased control obtained by spraying at intervals of 2 rather than 3 weeks.

Weather conditions caused epidemic outbreaks of chocolate spot (*Botrytis cinerea*) of field [broad] beans. Attacks of snow mould (*Fusarium nivale*) [*Calonectria nivalis*] were common on turf and lawns, and 1 of dollar spot (*Sclerotinia homoeocarpa*) [**37**, p. 4] was recorded. Two cases of potato gangrene (*Phoma foveata*)

were reported. The increase in the amount of apple fruit lost by *Gloeosporium* spp. since a survey was made in 1938 was noteworthy.

Records of special interest were oedema of *Solanum capsicastrum*, *Alternaria senecionis* on cineraria, *Myrothecium roridum* on violas, and plum mosaic [plum line pattern] virus in a glasshouse peach tree.

Болести и неприятели, появили се по културните растения у нас през 1954 год. Болести и неприятели, появили се по културните растения в България през 1955 год. [Diseases and pests on cultivated plants in Bulgaria in 1954; 1955.]—Бюл. раст. Защ (*Bull. Plant Prot., Sofia*), **4** (*1956*), 6–7, pp. 1–74, 1956; **5** (*1957*), 1(8), pp. 1–83, 1957.

These reports deal seriatim with the diseases recorded on each crop. These include *Tilletia contraversa* [map 297], *Septoria nodorum* [map 283], and *Cercosporella herpotrichoides* [map 74] on wheat, the last named also to some extent on rye, *Alternaria ricini* on castor bean [map 345], *Colletotrichum linicola* on flax [map 159], *Polyspora lini* on cotton and flax [map 88], *Pseudoperonospora humuli* on hops [map 14], beet curly top virus on beet [map 24], *Sclerotium cepivorum* on onion [map 331], *Pseudomonas angulata* on tobacco [map 321], *Colletotrichum lagenarium* on melons [map 313], and *Cladosporium cucumerinum* on cucumbers [map 310].

Plant disease survey for the twelve months ending 30th June 1957. Twenty-seventh Annual Report N.S.W. Department of Agriculture. Biological Branch—Division of Science Services.—32 pp., 1 map [1957. Mimeographed.]

In this report [cf. **36**, p. 575; **37**, p. 133] it is noted that eye spot (*Cercosporella herpotrichoides*) on wheat [map 74], recorded for the first time in N.S.W. at the Agricultural Research Institute, Wagga, was found to be quite widespread in the region. [Barley] yellow dwarf virus [map 332] was found on wheat in the Tamworth district.

Septoria spot (*S. depressa*) on citrus [**30**, p. 558] was more severe than in previous years in the Murray River area, where conditions favoured it; the perfect state (*Mycosphaerella* sp.) was found on fallen lemon leaves. Scaly butt [citrus exocortis virus] in infected budwood resulted in considerable development of the disease on Valencia orange on trifoliate stock.

Bacterial canker (*Pseudomonas syringae*) [cf. **36**, p. 454] was much more severe on cherry than of recent years. A decline condition of vine apparently due to virus was observed over an area of 750 acres, the symptoms resembling Pierce's disease [lucerne dwarf virus: cf. **37**, p. 131]. The distribution suggests its presence for many years and recent more rapid extension in abnormally wet seasons. Fruit spot (*Cercospora cladosporioides*) [**34**, p. 284] on olives caused 80–95% infection on fruit of the var. Verdale, and slight infection on Mission; no other vars. appeared susceptible. Foliage infection was not observed but the disease must have been widespread at a very low level in previous years.

The following diseases were found on ornamentals: branch wilt (*Fusarium roseum*) of carnation, causing severe damage; powdery mildew (*Oidium* sp.), recorded for the first time on *Gerbera*; a stem canker (*Cercospora* [*Mycosphaerella*] *rosicola*) newly recorded on roses; and a leaf spot (*Cercospora salicina*) [cf. **25**, p. 578] newly recorded on willows (*Salix babylonica*, *S. fragilis*, and *S. vitellina* var. *aurea*). A virus disease caused severe damage to stocks [species not specified]. Inward rolling of young leaves and bending of the growing point preceded a prominent leaf pattern, with initial vein clearing and subsequent total yellowing. Some 50% of the plants concerned were affected during the winter and made no further growth.

A prolonged cool, wet spring and shortage of certified seed resulted in unusually severe occurrence of halo blight (*Pseudomonas medicaginis* var. [f.sp] *phaseolicola*) [**33**, p. 211; cf. **37**, p. 195] on beans [*Phaseolus vulgaris*] on the coast. Leaf spot

(*Centrospora acerina*) was recorded (for the first time) on silver beet [cf. **36**, p. 682]. Club root (*Plasmodiophora brassicae*) continues to be severe on crucifers. A leaf spot on Heinz Pickling gherkin [*Cucumis anguria*] on two properties was suspected to be caused by *Pseudomonas lacrymans*, but did not extend to the fruit and the 'tear-drop' effect was absent. There was an obvious relation between infection and the source of seed.

Annual Report on the Department of Agriculture of the Northern Region of Nigeria, 1954–55.—124 pp., 1 graph, 1957.

In the botany section (pp. 41–67) of this report [cf. **35**, p. 357; **37**, p. 203], compiled by A. R. Maurer, Elizabeth Harrison, and C. W. Morgan, it is stated that a plant pathology section has been established. Red rot of sugarcane (*Colletotrichum falcatum*) [*Glomerella tucumanensis*] is often severe at harvest. Groundnut rosette [virus: **36**, p. 380] continues to affect production in parts of the Middle Belt. No cassava varieties truly resistant to cassava mosaic virus [loc. cit.] have been found. A wilt of cassava (*Fusarium equiseti*) caused considerable damage in an experimental field, but has not reappeared after destruction of infected material. Gummosis [cause unspecified] has been particularly severe on citrus grafted on rough lemon stock in flooded areas. *Elsinoe fawcetti* was severe on rough lemon seedlings. The treatment of covered smut (*Sphacelotheca sorghi*) of guinea corn [*Sorghum guineense*] with copper carbonate is increasing extensively.

Lefèvre (P. C.). **La recherche phytopathologique au Congo belge.** [Phytopathological research in the Belgian Congo.]—*Meded. LandbHogesch. Gent*, **22**, 3, pp. 349–376, 1957.

The 1st part of this account (pp. 349–350) deals with the period up to 1933, the main problems studied and the scientific workers concerned being listed. Part 2 (pp. 350–355), from 1934 onwards, is concerned with the foundation and aims of INEAC, especially as these concern phytopathology. In the 3rd part (pp. 355–376) there is a recapitulation of some of the results obtained, which have been largely noticed in this *Review*.

Dobrozrakova (Mme T. L.), Letova (Mme M. F.), Stepanov (K. M.), & Khokhryakov (M. K.). Определитель болезней растения. [Definition of plant diseases.]—661 pp., Сельхозгиз [State Agricultural Publisher], Leningrad, 1956. Roubles 15.40. [Abs. from *Referat Zh. Biol., 1957*, 18, p. 180, 1957.]

This practical, illustrated book presents details of the diseases in U.S.S.R. and their control. It is divided into sections on diseases of cereals, grasses, and forage crops, diseases of fibres and oil plants, diseases of root crops, vegetables, and legumes, diseases of fruit, berries, nuts, and subtropical plants, and diseases of plants producing alcohol, medicines, and narcotics.

Christov (A.). Химическа защита на растенията. [The chemical protection of plants.]—287 pp., 1 col. pl., 21 fig., Zemizdat, Sofia, 1957. [37 refs.] Leva 11.

This book is intended for university use and as a handbook for scientists working on plant protection in Bulgaria. Following an historical introduction, there are sections on 75 inorganic and 95 organic compounds. The last part of the book, devoted to the control of plant diseases and pests, includes chapters on soil and seed disinfection, protection in storage, and protection of the growing plant.

Husain (A.). **Mode of pathogenesis of the Granville wilt bacterium, Pseudomonas solanacearum.**—*Diss. Abstr.*, **17**, 8, pp. 1649–1650, 1957.

At North Carolina State College the author compared 3 strains of *Pseudomonas*

solanacearum [cf. **35**, p. 281] for their specific effects on host plants and production of toxins in culture. The highly pathogenic strain F_1 caused rapid wilting and death of the host [? tobacco]; the weakly pathogenic B_2 did not induce wilting, but caused yellowing and stunting; and the avirulent B_1 produced no external symptoms.

A heat-stable, viscous, complex polysaccharide was obtained by alcoholic precipitation from the culture filtrate of F_1, but not from those of B_1 and B_2. This material caused reversible wilting of tomato cuttings. A heat-stable component of the tracheal fluid from diseased tomato and tobacco plants also induced partially reversible wilting in cuttings. The tracheal fluid of healthy plants caused no injury. In smears stained by the eosin-serum method a loose slime layer was demonstrated round the cells of F_1 obtained from culture on solid media and from exudates from diseased plants. Such a slime was not present round the cells of B_1 or B_2. The expressed sap of diseased tomato plants contained 3 enzymes present in culture filtrates of all 3 strains, whereas sap of healthy plants did not.

Heated and non-heated solutions of a crude pectic enzyme preparation (pectinol-100D) caused wilting of and severe injury to tomato cuttings, but only the non-heated solutions caused maceration. Wilting was also caused by a highly purified cellulase from *Myrothecium verrucaria* [cf. **34**, p. 239].

Breakdown of the cell walls and middle lamellae similar to that in diseased tomato and tobacco plants occurred in cuttings treated with bacteria-free culture filtrates and purified enzymes. It is concluded that the viscosity of the vascular stream is much increased by the slime formed by F_1, impeding and eventually blocking water movement.

RAMAMURTHI (C. S.). **Comparative studies on some Gram-positive phytopathogenic bacteria and their relationship to the Corynebacteria.**—*Diss. Abstr.*, **17**, 7, pp. 1447–1448, 1957.

In studies at Cornell University, *Corynebacterium fascians*, *C. flaccumfaciens*, *C. insidiosum*, *C. michiganense*, *C. poinsettiae*, *C. sepedonicum*, *C. equi*, *C. renale*, and *C. creatinovorens* were examined to determine how far they resembled acknowledged species of *C.* The evidence obtained showed that all are aerobic, and their cellular morphology is governed by physical and nutritional factors as in the type species. Two distinct morphological groups were recognized on the basis of cellular and colony morphology on solid media: one produced moist, filiform, entire colonies consisting of predominantly unicellular elements typical of true corynebacteria; it included all except *C. fascians* and *C. renale*, which constituted the 2nd group; they tended to continue growth after cell division, without cell separation, the colonies resembling actinomycetes in being relatively dry, rugose, and undulate, and having fragmenting, multicellular structures. The plant pathogens tolerated and grew at temperatures lower than those required by the animal parasites.

Typical corynebacteria do not reduce NO_3. They may utilize NH_4 salts feebly, if growth factors and glucose are present, but they flourish on organic N without a carbohydrate supplement and are able to oxidize organic N compounds, such as creatine, uric acid, purines, and pyrimidines. They have deaminase but not urease activity. They do not produce H_2S, indole, or acetyl-methyl-carbinol. They are neither diastatic nor lipolytic, nor do they decompose tyrosine. The pathogenic species require thiamine and histidine.

C. fascians and *C. renale* differ widely from the above in morphological and physiological characters. They produce a characteristic alkaline reaction even in the presence of carbohydrates and in milk. They do not hydrolyse esculin, but utilize arginine. They do not reduce litmus or methylene blue. *C. fascians* produces H_2S, is lipolytic, and decomposes tyrosine slowly. These species are considered to belong to *Nocardia*.

VERONA (O.) & GAMBOGI (P.). **Disformie e disfunzioni in Pseudomonas savastanoi (Smith) Stevens.** [Abnormal formation and disfunction in *Pseudomonas savastanoi* (Smith) Stevens.] –*Phytopath. Z.*, **31**, 2, pp. 158–161, 3 fig., 4 graphs, 1957. [German summary.]

At the Istituto di Patologia Vegetale, Pisa, Italy, *P. savastanoi* when cultured with amino-acids (arginine and histidine) and lithium salts developed malformations, including filamentous margins, variations in the oxygen quotient, and reduction of virulence.

CASARINI (B.) & PUCCI (E.). **Prove 'in vitro' della efficacia fungicida di diversi anticrittogamici su funghi scelti fra gli abituali 'test' e fra alcuni dannosi parassiti delle piante.** ['In vitro' tests of the fungicidal efficacy of various fungicides against fungi selected from among the usual 'test' organisms and some harmful parasites of plants.]—*Ric. sci.*, **27**, 5, pp. 1468–1477, 12 graphs, 1957. [French, English, and German summaries.]

At the Laboratorio Sperimentale di Patologia Vegetale, Bologna, Italy, the common test fungi *Alternaria oleracea* [*A. brassicicola*] and *Stemphylium sarciniforme* were compared with *Fusicladium dendriticum* [*Venturia inaequalis*], *Sclerotinia fructigena*, *Plasmopara viticola*, and *Cercospora beticola* for their reaction to fungicides *in vitro*. These were Caffaro powder, aspor, pomasol, 2,4 dichloro-6-(*o*-chloroaniline)1,3,5-triazine, SR 406, and verdasan, tested at 2, 6, 17, 55, and 166 p.p.m. by the test tube dilution technique, using 100,000 spores/ml. [**26**, p. 497] at 20° C. (25° for *C. beticola*). The results obtained clearly demonstrated that no relationship whatever existed between the two classes of fungi tested in respect of their reactions. Preliminary *in vitro* tests of fungicides should therefore be made with the fungi against which they are intended to be used in the field.

Caffaro powder was very effective against all the fungi except *V. inaequalis*, aspor against the latter, *P. viticola*, and *Stemphylium sarciniforme*, SR 406 against the two last-named and *Sclerotinia fructigena*, pomasol against the latter, and verdasan against *C. beticola*, *A. brassicicola*, *V. inaequalis*, and *Stemphylium sarciniforme*.

TOMAN (M.) & ŠROBAL (M.). **Laboratórna porovnávacia slúška inherentnej fungicidity látok typu RHgX na Tilletia sp. Příspěvek k metodike slúšok fungicídných přípravkov, V.** [Comparative laboratory test of inherent fungicidal activity of material of the type RHgX against *Tilletia* sp. Contribution to the method of testing fungicidal preparations, V.]—*Biológia, Bratislava*, **12**, 2, pp. 81–89, 1 graph, 1 diag., 1957. [Russian and German summaries.]

At the Bratislava Technological Institute, compounds were tested against *Tilletia foetida* spores by incorporation in soil extract agar. It was concluded that the efficiency of mercury in ethyl HgBr is 135±11·6% the efficiency of mercury in the phenyl HgBr.

BURCHFIELD (H. P.), SCHECHTMAN (JOAN), & MAGDOFF (BEATRICE S.). **Effects of temperature and composition on crystallite growth in Bordeaux mixtures.**—*Contr. Boyce Thompson Inst.*, **19**, 2, pp. 117–132, 7 graphs, 1957.

These further studies [**35**, p. 310] indicate that the most stable hydrogel is best produced in practice by reduction of the lime content to 40% (or less) of the amount of $CuSO_4$ in the formulation. Thus 10:4:100 Bordeaux forms micro-crystals readily adherent to foliage, while 10:3·2:100 Bordeaux forms even smaller ones, and has outstanding settling characteristics.

BURCHFIELD (H. P.) & GOENAGA (A.). **Equipment for producing simulated rains for measuring the tenacity of spray deposits to foliage.**—*Contr. Boyce Thompson Inst.*, **19**, 2, pp. 133–140, 2 fig., 1957.

An apparatus is described in which a large number of capillary tubes, arranged in

the form of a trapezoid, projecting from the bottom of a reservoir of water kept at a constant level, caused artificial rainfall to fall on a sector of a turntable. Test leaves or potted plants are placed on the turntable 6 ft. below. The rainfall rate can be varied from 0·2–1·5 in./hr. and the temperatures of the water from 40–95° F.

With this apparatus it was possible to demonstrate a 2·9% increase in the tenacity of Bordeaux mixture on banana leaves by the addition of urea; also that the control of early blight [*Alternaria solani*] on tomato by 125 and 250 p.p.m. captan after 25 in. rain was similar to that obtained at 16 p.p.m. without rain, suggesting 85–95% loss of fungicide by weathering.

Burchfield (H. P.) & Goenaga (A.). **Some factors governing the deposition and tenacity of copper fungicide sprays.**—*Contr. Boyce Thompson Inst.*, **19**, 2, pp. 141–156, 2 graphs, 1957.

The retention of Cu by the waxy surfaces of banana leaves [cf. **37**, p. 48] and the non-waxy surfaces of castor bean (*Ricinus communis*) cotyledons after exposure to artificial rainfall [see above] was investigated. Without surfactants 10:10:100 Bordeaux mixture was hardly adherent to newly opened banana leaves, though it was so on castor bean. Of the surfactants used, triton X–114 was the most effective; at 100 p.p.m. 86% of the Cu deposit on banana leaves was retained after 0·5 in. rain and at 300 p.p.m. 74% after 8 in. It also increased the rate of deposit build up on these leaves.

In aged Bordeaux (24 hr. at room temp.) the formation of sphaerocrystals prevents satisfactory retention, but the growth of these was retarded by the addition of sucrose or marasperse C (predominantly calcium lignosulphonate) at 480 p.p.m. Good retention was also obtained on reduction of the lime to 10:4:100 or less [see below]. Freshly prepared 10:10:100 Bordeaux adhered better than some other particulate Cu fungicides tested (cuprous oxide, dried Bordeaux, and copper quinolinolate), probably because it is a deformable hydrogel, drying to form films that fit the contours of the leaf surface and to give better areas of contact/wt. of fungicide than wettable powers with discrete particles.

There was a linear relation between the amount of rain and log. tenacity for fresh 10:10:100 Bordeaux on castor bean leaves, but a rapid initial loss followed by a slower rate occurred with aged Bordeaux and particulate Cu fungicides. A linear relation appears characteristic of homogeneous spray deposits; a curvilinear one indicates that various components of the residue differ in their adherent abilities.

McCallan (S. E. A.). **Effectiveness of various formulations of Bordeaux mixture in controlling early and late blights of Tomato in greenhouse tests.**—*Contr. Boyce Thompson Inst.*, **19**, 2, pp. 157–167, 2 graphs, 1957.

Bordeaux mixture used to control sigatoka disease of bananas (*Mycosphaerella musicola*) may have to be kept for some time after preparation because of the vagaries of rainfall. As it does not seem possible at present to evaluate control of *M. musicola* in the greenhouse, direct evaluation of the stability of various formulations was assessed against *Alternaria solani* and *Phytophthora infestans* on tomato [cf. **23**, p. 34]. To maintain consistency in the mixtures potted plants were sprayed with specific volumes of each formulation, rather than a dilution series, to give deposits of 0·32 and 1·6 mg. Cu/100 cm^2 leaf surface. After drying for 2 hr. plants were exposed to 1 in. of artificial rain [see above] in 40 min., dried again, and inoculated with spores.

Without rain, fresh and 24-hr. aged 10:10:100. Bordeaux gave similar control, but after rain the aged mixture was markedly poorer. An aged 10:4:100 mixture [see above], however, was equal to the fresh 10:10:100 formulation both before and after rain, and 10:3·2:100 even more effective. Addition of 0·025% triton X–114

or 2% maracarb NC (a mixture of Na and Ca lignosulphonates [see above]; Marathon Corp., Rothschild, Wisc.) to 10:10:100 Bordeaux extended its effective period for 3 weeks.

GOOSSEN (H.). **Abtropfen, Abtrift und Verschweben von Flüssigkeitstropfen.** [Run off, drift, and dispersion of liquid droplets.]—*NachrBl. dtsch. PflSchDienst (Braunschweig), Stuttgart*, **10**, 1, pp. 10–15, 5 fig., 1 graph, 1958.

In this paper from the Pflanzenschutzamt Münster (Westf.) the author discusses the effects of varying spray volume, droplet size, and the speed of the accompanying air stream on the coverage achieved by fungicidal spraying. He emphasizes the value of a blower in increasing the total deposit and improving the distribution of the residues obtainable with a given volume of spray mixture.

RESPLANDY (RENÉE). **Les maladies parasitaires des principales cultures tropicales. Revue bibliographique. XX.** [The parasitic diseases of the principal tropical crops. A bibliographical review. XX.]—*Rev. Mycol., Paris*, **22**, *Suppl. colon.* 2, pp. 85–106, 1957. [147 refs.]

Further notes in this series [**37**, p. 10] are based on world literature published mainly during 1955–57.

GORLENKO (M. F.). [Ed.] Иммунитет растении к заболеваниям и вредителям. [The immunity of plants from diseases and pests.]—212 pp., 14 fig., 5 graphs, Agricultural Literature, Moscow, 1956. Roubles 5.50. [Received 1958.]

This collection of articles, produced under the auspices of the Council of the section of Plant Protection in the Lenin Agricultural Academy of Science, includes: P. M. ZHUKOVSKII (pp. 6–9), on the problem of selecting plants for resistance to diseases. Mme T. I. FEDOTOVA (pp. 9–18), on the varietal susceptibility of agricultural plants to diseases. S. N. MUROMTSEV (pp. 19–28), on plant immunity. L. F. RUSAKOV (pp. 28–35), on the regional resistance of cereal varieties to diseases; Hybrid 599, Kursas, L'govskaya 873, Zernogradka, Hybrid 491, Shavpkha, Arandany, and Shark are the most resistant winter wheat varieties to [unspecified] diseases. Dzalisura 35–3, Kazachinskaya, Hybrid 559, Surkhak 5688, Arandany, and Shark are the most resistant to bunt [*Tilletia caries*: **36**, p. 462]. Fil'gia, Severyanka, Moskovka, Gordeiforme Nos. 10, 432, and 496, Bezenchukskaya 98, Narodnaya, Chakinskaya 226, Melyanopus 69, and Dika spring wheats are the most resistant to loose smut [*Ustilago tritici*: **35**, p. 598].

B. A. RUBIN (pp. 35–46), on the biochemical nature of plant immunity; in clover infected by *Erysiphe polygoni* a susceptible variety gives at first the impression of normal coexistence. A different picture is observed in a resistant variety where the infection hyphae cannot develop fully. The cells die as the hyphae penetrate and there is a hypersensitive reaction. Respiration is considered to play the most important role in the protective reaction; it increases for a short time in a susceptible variety, followed by regression; in a resistant variety it increases for a long period. The acidifying system reacts differently in resistant and susceptible varieties, increasing greatly in the first and being very weak in the second. This difference is noticed in cabbage infected by *Botrytis cinerea*, citrus by *Penicillium italicum*, potatoes by *Phytophthora infestans*, flax by *Verticillium* sp., and other plants.

D. D. VORDEREVSKII (pp. 46–55), on the method of investigation of plant varieties resistant to diseases. N. A. DOROZKIN (pp. 55–57) and Mme A. A. BABAYAN (pp. 57–64), on the growth and development intensity of flax and its resistance to wilt [unspecified]. Mme A. M. MAMONTOVA (pp. 64–71), on the vegetative variability of the fungus as one of the causes of the loss of wheat varieties to brown rust [*Puccinia triticina*: **36**, p. 481]. M. Z. ANPILOGOV (pp. 71–80), on methods of selecting bread wheats for resistance to fungal diseases; the following points are

discussed: resistance characteristics of the parent material to fungal diseases and selection for crossing; study on varietal resistance in ontogenetics; geographical studies of resistance; the influence of seed production on resistance; ecological conditions as a factor in the loss of varietal resistance; the adaptability of the parasite as a basic cause for the loss of varietal resistance; the importance of the infection background in the selection for immunity; the importance of the physiological heterogeneity of varieties in hybridization; ways of increasing and preserving resistance to diseases in different varieties by continuous selection.

V. N. Shevchenko (pp. 80–94), on the selection of sugar beet and other crops for disease resistance; the sugar beet var. F 986 and K018 from the Kirghiz proved highly resistant to mildew [*Peronospora schachtii*: **35**, p. 501]. The new millet (*Panicum miliaceum*) var. VNIS-29 is recommended for its productivity and strong resistance to [unspecified] rot.

V. P. Murav'ev (pp. 94–97), on the importance of artificial infection of wheat varieties resistant to bunt (*Tilletia* spp.). A. A. Gorlach (pp. 97–101), on the selection of winter wheat for resistance to fungi; Lesostepka 74 and 75 winter wheats are resistant to brown rust while Lutescens still proves the most resistant to loose smut. Mme I. V. Zhukova & V. F. Kukin (pp. 101–103), on the influence of artificial secondary infection by smut on the variability of the resistance of spring and summer wheat and oat hybrids. Mme O. N. Voitchishina (pp. 103–107) on the development of resistance to brown rust in winter wheat hybrids by unusual cultivation; supplementary root feeding was given in the different phases of development and the hybrids were sprayed with S and with 2% table salt [NaCl] solution; hybrids with a resistant maternal parent are more resistant than others under these conditions. F. E. Nemlienko (pp. 107–114), on the peculiarities of resistance in maize to rod-shaped bacteriosis (*Bacillus mesentericus*); greater susceptibility was observed in the upper grains of the cob [**35**, p. 602], infection in cobs with an exposed top being 3–10 times greater than in covered ones. Brounkonty and Sterling were 3–4 times more resistant to artificial inoculation than susceptible varieties, which were infected up to 88·3% in the milky and 27·8% in the tassel stage but not at all at the dough stage or full maturity.

S. I. Moskovetz (pp. 114–116), on the introduction of flax varieties resistant to diseases; the Azerbaidjan vars. Sy-ailendy-2966–1 and 4768–1, Az 30, Az 68, Sy 12, and Sy 14 crossed with short-fibre flax gave varieties exceptionally resistant to the common flax diseases, especially [unspecified] wilt and [unspecified] leaf crinkle. Mme A. I. Solov'eva (pp. 117–126), on *Verticillium* wilt of flax in Uzbec., S.S.R., studied the conditions of spread of the disease [*V. albo-atrum*] and resistant vars., such as C-460, 108-F, 137-F. Changes occur in the races of the fungus and the varieties lose their resistance to new races. Mme T. T. Popova (pp. 126–131), on methods of development of disease resistance in long-fibre flax; a new vaccine has been prepared against a complex of flax diseases, including *Penicillium* and *Bacterium gamma* sp. nov. [no description].

E. E. Fomin (pp. 131–134), on some aspects of plant selection for resistance to diseases. A. M. Alpat'ev (pp. 135–140), on a method of investigation of vegetable varieties resistant to diseases and pests. S. M. Bukasov (pp. 140–144), on the selection of immune potatoes; the Acaulia group has proved resistant to virus strains X^N and X^E and to virus Y. Immunity from virus X is possessed by *S*[*olanum*] *sukrenze* and the 41956 form of the chilli var. Vilyaroela. Glabrescentia is immune from early blight [*Alternaria solani*].

R. M. Galachyan (pp. 144–150), on the resistance of tomatoes to bacterial canker [*Corynebacterium michiganense*: **36**, p. 793]; studies in Erevane, Armenia, have been in progress since 1949 and experiments in the field, greenhouse, and laboratory have shown that infection is transmitted particularly quickly by the root system, when part has been removed. Marglobe, Anait, and Break o'Day have

constantly resisted the disease and are considered the most resistant varieties in Armenia. E. V. MARYANOVICH (pp. 150–154), on resistance of cabbage to vascular bacteriosis [*Xanthomonas campestris*: **36**, p. 801]; Likurishka and Skvirskaya were resistant to infection by an [unspecified] vector but proved susceptible to soil infection. Unfavourable conditions for the disease were inadequate moisture and low temperature.

B. V. KVASNIKOV, Mme E. A. OSNITSKAYA, & Mme K. N. YATSININA (pp. 157–172), on the method of investigation of vegetable varieties resistant to diseases; cabbage varieties susceptible to club root [*Plasmodiophora brassicae*] develop normally and resist the disease when root-grafted with a resistant variety; the contrary is observed with the most resistant variety, Yazik Zivornika, when grafted with a susceptible variety. Carrot varieties in storage should be kept at temperatures under 15–18° C. to prevent the possible spread of *Alternaria* [*dauci*] and rot [*Sclerotinia sclerotiorum*: **36**, p. 59]. The cucumber varieties most resistant to mosaic virus are Ryabchik, Berlizovskii, Borshchagovskii, and Pobeditel. Pea hybrids resistant to *Ascochyta* [*pisi*] should be derived from a mother variety with low sugar content, as those with high sugar content are highly susceptible. Information from the West Siberian Institute for Plant Pathology suggested that resistance in hybrids is hereditary and increases gradually. *Lycopersicon pimpinellifolium* was the most resistant to tomato canker [*C. michiganense*].

T. D. STRAKHOV & T. V. YAROSHENKO (pp. 173–184), on the role of nutritive factors in the increase of plant immunity to diseases. Mme A. S. PIMENOVA (pp. 184–187), on the ways of increasing and preserving the resistance of vegetable crops to diseases.

MAJUMDAR (S. K.) & BOSE (S. K.). **Mycobacillin, a new antifungal antibiotic produced by B. subtilis.**—*Nature, Lond.*, **181**, 4602, pp. 134–135, 1958.

It is reported from the Dept of Applied Chemistry, University College of Technology, Calcutta, that during studies on the distribution of antifungal organisms in Indian fruits, vegetables, and soils a strain of *B*[*acillus*] *subtilis* [**34**, p. 239], highly active against fungi, was isolated. The highest yield of antibiotic was obtained in a medium of potato extract, casein hydrolysate, beet extract, and glucose. It possesses a wide antifungal spectrum, inhibiting the growth of *Aspergillus niger* at 0·02 mg./ml. in agar, and is a ninhydrin-negative cyclic polypeptide, somewhat different from the other known antifungal antibiotics.

LINKS (J.), ROMBOUTS (J. E.), & KEULEN (PITRIKA). **The 'bulging factor', a fungistatic antibiotic produced by a Streptomyces strain, with evidence of an active water-excreting mechanism in fungi.**—*J. gen. Microbiol.*, **17**, 3, pp. 596–601, 1957.

Studies at the Central Laboratory, Weesp, and the Agrobiological Laboratory, 's-Graveland, Netherlands, on the chemical nature and mode of action of the 'bulging factor', a new antibiotic produced by strain S 303 of *Streptomyces* isolated from soil in the Netherlands, are described. The antibiotic, which is related to streptothricin chemically, causes the hyphae of fungi (*Mycosphaerella pinodes* in these tests) to swell in a characteristic fashion (J. E. Rombouts, *Atti* (*VI*) *Congr. int. Microbiol.*, **3**, p. 205, 1953).

SHAPIRO (S.). **Method for evaluating fungus growth on large areas.**—Reprinted from *Paint Varn. Prod.*, **46**, 10, 2 pp., 2 fig., 1 diag., 1956. [Received Dec. 1957.]

This method for the evaluation of fungicidal paints [cf. **36**, p. 260] on large areas, where fungus growth may occur irregularly, involves the use of a template to outline a series of small test surfaces in a pre-arranged pattern, and is practicable when the growth is widely distributed over the area. It is suggested that the

template opening be $\frac{1}{10}$ of the width $\times \frac{1}{10}$ of the length of the test panel, and the mean of 22 observations taken; on larger areas a smaller template opening and more readings can be employed.

Plant quarantine announcements.—*F.A.O. Pl. Prot. Bull.*, **6**, 3, pp. 45–46, 1957.

Legislation concerning importation of plants into India by air has been revised under notifications No. 6–10/53-Dte. 1 and 5 of 13 June 1957, published in *Gaz. India*, **25**, 1957. Certificated, permitted plant material may be imported through the airports at Bombay, Madras, Calcutta, or New Delhi after 15 days' notice.

The Agricultural Pest Act, 1957 (*Govt Gaz.*, **189**, 5887, 1957) consolidates legislation concerning plant importation into the Union of S. Africa.

HACSKAYLO (E.). **Mycorrhizae of trees with special emphasis on physiology of ectotrophic types.**—*Ohio J. Sci.*, **57**, 6, pp. 350–357, 1 pl., 1957.

This paper from the U.S. Dept Agric. was presented at the Forest Tree Physiology Symposium at Ohio Agricultural Experiment Station 13–14 June 1957. After some generalisations on the classes of mycorrhiza and their formation and an outline of the effects of soil environment, mineral nutrition, and light, the author reviewed the status of current knowledge of the reciprocal exchanges in mycorrhiza and certain practical applications.

TRAPPE (J. M.). **Some probable mycorrhizal associations in the Pacific Northwest.**—*Northw. Sci.*, **31**, 4, pp. 183–185, 1957.

Probable mycorrhizal associations were observed by the author in the field between a number of agarics and boleti and *Pinus contorta*, *P. ponderosa*, *Pseudotsuga menziesii*, *Abies grandis*, western larch (*Larix occidentalis*), and aspen (*Populus tremula* and *P. tremuloides*). *Gyromitra* [*Helvella*] *esculenta* was closely associated with *P. menziesii* in the Puget Sound area.

NIEKRASZ (ANNA). **Mykorhiza u Medicago falcata L.** [Mycorrhiza of *Medicago falcata* L.]—*Zesz. Nauk. Uniw. Łódź.* [*Sci. Stud. Univ. Łódź*], **2**, 2, pp. 69–75, 8 fig., 1957. [Russian and French summaries. 36 refs.]

Mycorrhizal mycelium was found in *M. falcata* in the primary cortex and central cylinder of the root, among and within the elements of the conducting tissues. There is no limited zone of digestion, which is performed in the cells of the invaded areas.

BALDACCI (E.), BETTO (E.), FOÀ (RITA), & VOLPI (A.). **La richiesta di fosforo nei tessuti di piante invasi da funghi o da virus, esaminata con l'impiego del P^{32}.** [The phosphorus requirements of plant tissues invaded by fungi or viruses, examined by the use of P^{32}.]—*Ric. sci.*, **27**, 9, pp. 2674–2676, 1957. [French, English, and German summaries.]

In studies at the University of Milan, the authors found that, administered through the leaves of healthy bean (*Phaseolus vulgaris*) plants, P^{32} [cf. **36**, p. 712] is absorbed and translocated in a quantitatively different manner in the various organs, distribution decreasing progressively in this order: compound leaves, stems, roots, and primary leaves. The P^{32} requirements are higher in tissues damaged and then inoculated with fungi or viruses than in healthy tissues; in beans experimentally infected with *Uromyces appendiculatus* P^{32} began to arrive in the leaves 4 days after inoculation, before the development of external symptoms.

OWENS (R. G.) & MILLER (L. P.). **Intracellular distribution of metal ions and organic fungicides in fungus spores.**—*Contr. Boyce Thompson Inst.*, **19**, 2, pp. 177–188, 1 graph, 1957.

Conidia of *Neurospora sitophila* and *Aspergillus niger* were disintegrated by sonic

treatment after being given sublethal doses of labelled dichlone, glyodin base, and a number of metallic ions (Ag, Ce, Zn, Cd, and Hg) [cf. **36**, p. 542].

Radioactive investigation of various fractions secured by centrifugation showed that more of all the toxicants but dichlone accumulated in at least one of the particulate fractions than in the spore as a whole, on the basis of equivalent cell solid, and little, if any, was found in the cell walls. The distribution of the substances is described and tabulated. It was concluded that the toxicants are bound to a large extent by cytoplasmic components not directly involved in metabolism, resulting in removal of much toxicant from solution before spore viability is considerably reduced and continued absorption even after lethal amounts have been acquired.

Taber (W. A.). **The influence of the inoculum on variability in comparative nutritional experiments with fungi.**—*Canad. J. Microbiol.*, **3**, 6, pp. 803–812, 1 graph, 1957.

In further studies at the Prairie Regional Laboratory, Saskatoon, Saskatchewan [**36**, p. 465], it was ascertained that the quantity of inoculum used to start cultures of *Claviceps purpurea* affected the rate of growth on mannitol and to a lesser extent the total growth, the rate varying directly with increasing size of inoculum. As the amount of inoculum decreased, variation among replicas increased, and this affected the ability of the experiment to distinguish between similar mean growth responses. It is suggested that the smallest amount of inoculum represented by a coefficient of variation of about 10% should be considered as acceptable.

The effect of heterokaryosis [**36**, p. 111] on growth rate in a fungus producing components capable of different growth rates was demonstrated by the author with *Isaria cretacea*.

Lavee (S.). **A physiological effect of triethanolamine on the development of Sclerotium rolfsii (Sacc.).**—*Nature, Lond.*, **180**, 4600, p. 1494, 1957.

At the Agricultural Research Station, Rehovot, Israel, it was found that when triethanolamine was added to potato dextrose agar on which *S. rolfsii* was grown, at higher concentrations the appearance of new sclerotia was retarded and their total number reduced. No germination of sclerotia took place at over 2,000 p.p.m. The effect appeared to be primarily fungistatic.

Naguib (K.). **The pH factor in the metabolism of Fusarium moniliforme Sheldon on sucrose.**—*Canad. J. Bot.*, **36**, 1, pp. 57–63, 1 graph, 1958.

In this study of *F. moniliforme* [*Gibberella fujikuroi*: cf. **36**, p. 204] at Cairo University, Giza, 1-week-old fungal mats were used for observations over a 48-hr. period in fresh liquid media at 4 pH levels. Sucrose inversion was found to be little affected by pH $> 5{\cdot}4$, but was inhibited at pH 4; lowering the pH below 5·4 reduced sugar uptake more than raising it above this level. CO_2 output/unit dry weight of mycelium was lowest at the pH opt. for growth (5·4), when sucrose inversion and uptake were max. Thus the effect of pH on growth was apparently the total of its effects on the various enzymatic processes affecting the metabolism of the fungus. It is possible that entry of H or OH ions into the mycelium might alter the internal pH of the organism.

Newton (W.). **The formation of a yellow pigment by Phytophthora infestans in the presence of *p*-amino benzoic acid.**—Abs. in *Proc. Canad. phytopath. Soc.*, 25, p. 16, 1957.

At the Plant Pathology Laboratory, Saanichton, British Columbia, *P. infestans* developed a bright-yellow pigment when growing on oatmeal agar plates plus

p-amino benzoic acid. *P. cactorum* from collar rot lesions [host unspecified], *P. parasitica* from tomato rot lesions, and *P. parasitica* var. *nicotianae* from tobacco did not produce this coloration under the same conditions.

CROSSAN (D. F.) & LYNCH (D. L.). **A qualitative comparison of the amino acid and sugar content of acid hydrolysates from the mycelium of several anthracnose fungi.**—*Phytopathology*, **48**, 1, pp. 55–57, 1958.

At the University of Delaware, Newark, 14 amino-acids and 5 sugars were identified by paper chromatography of hydrolysates of mycelium of *Colletotrichum tabacum*, *C. lagenarium* (races I and II), *C. capsici*, and *Gloeosporium piperatum* grown in a minimal mineral medium, with KNO_3 and glucose as the only sources of N and C. Qualitative differences which were detected between the fungi are tabulated. *C. capsici* contained glutamic acid, serine, and alanine, whereas *G. piperatum* did not. Race II of *C. lagenarium* was high in glutamic acid, but I had none. *C. tabacum* did not produce γ-butyric amino-acid, or threonine whereas all the others did. Such information might prove an aid to identification of species and races and to the elucidation of taxonomic relationships.

PILET (P. E.). **Activité anti-auxines-oxydasique de l'Uromyces pisi (Pers.) de By parasite d'Euphorbia cyparissias L.** [Antiauxine-oxydasic activity of *Uromyces pisi* (Pers.) de Bary, parasite of *Euphorbia cyparissias* L.] –*Phytopath. Z.*, **31**, 2, pp. 162–179, 1957. [German and English summaries.]

Further studies [**33**, p. 312] from the Laboratoire de Phytophysiologie, University of Lausanne, Switzerland, revealed that the leaves of *E. cyparissias* parasitized by *U. pisi* contain a higher content of extractible active auxins than the unparasitized ones. The activity of auxin-oxidases (enzymes regulating *in vivo* inactivation of auxins) is permanently stronger in healthy than in infected leaves. Extracts of this fungus mingled with extracts of healthy leaves clearly show this anti-enzymatic action. Exactly the same phenomena occurred in *E. verrucosa* leaves parasitized by *U. scutellatus*. It is not so much by hormone over-production in parasitized leaves that the presence of the fungus is manifested as by a non-destruction and therefore an accumulation of auxins in diseased plants, a phenomenon which may be accounted for by the anti-enzymatic action of the parasite.

FINK (H.) & HOPPENHAUS (K.-W.). **Beiträge zur biologischen Eiweißsynthese von höheren und niederen Pilzen und zur alimentären Lebernekrose der Ratte.** [Study on the biological synthesis of protein in higher and lower fungi, and alimentary liver necrosis in the Rat.]—*ForschBer. Wirtsch.- u. VerkehrsMin., Nordrhein-WestF.*, 389, 65 pp., 2 graphs, 1956. [Received 1958.]

At the Institut für Gärungswissenschaft und Enzymchemie der Universität, Cologne, young albino rats were raised on a diet with protein at equal levels, from mushrooms (*Psalliota campestris*) or *Boletus edulis*. The latter alone provided valuable protein, which was of high cystine content and comparable with that from animal sources. In further experiments protein was provided by *Torula* [*Candida*] *utilis* preparations. Their low value was revealed, as with the mushroom diet, by poor growth and liver necrosis.

RUSSELL (E. J.). **The world of the soil.**—xiv+237 pp., 26 pl. (2 col.), 3 fig., 3 diag., 5 graphs, 2 maps, London, W. Collins & Sons, Ltd., 1957. 25*s*.

This book, written mainly for non-specialist readers, analyses the structure of soil and traces its development. It deals, in part, with the forms of life made possible by different soils, and in its 10 chapters covering varied aspects of the soil are sections referring to soil fungi (pp. 71–78) and mineral deficiencies (pp. 142–160).

HACK (JUDITH E.). **The effect of spore germination and development on plate counts of fungi in soil.**—*J. gen. Microbiol.*, 17, 3, pp. 625–630, 1957.

At the Glasshouse Crops Research Institute, Littlehampton, Sussex, spores of *Didymella lycopersici* and of six soil fungi (*Penicillium* sp., *Cephalosporium* sp., *Cladosporium herbarum*, *Mucor mucedo*, *Peziza* sp., and *Trichoderma viride*) were introduced separately into soil spread over microscope slides in a film of agar. After direct observations had been made the soil from the slides was used for plate counts before germination, after, when mycelium had developed, and after fruiting [cf. **35**, p. 326].

The work showed that colony counts of *D. lycopersici* are not a suitable measure of the development of the mycelium of this fungus in sterilized soil. As the spores germinate, plate counts grow smaller and do not increase with mycelial development but they do reflect at once the occurrence of sporulation. It is suggested that destruction occurs during the plating process. *Penicillium* sp. and *Cephalosporium* sp. appeared to possess mycelial properties which rendered them resistant to this destruction, there being no decrease in the plate count when a large proportion of the spores had germinated. *M. mucedo* and *Peziza* sp. behaved similarly to *D. lycopersici.*

KRUSHEVA (Mme R.). Принос към проучване на паразитната гъбна флора на България. [Contribution to the study of the parasitic fungus flora of Bulgaria.]—*Supl. Acad. Sci. Bulg.*, **5**, pp. 406–418, 1956. [Russian and English summaries. Received Mar. 1958.]

This work describes 32 parasitic fungi newly recorded for Bulgaria and lists 32 new host records. The former include *Peronospora vincae* on *Vinca major*, *Puccinia gladioli* on gladiolus, *Septogloeum salicinum* on willow (*Salix fragilis*), *Phyllosticta cucurbitacearum* on *Cucurbita moschata*, *P. rubicola* on blackberry, *P. saccardoi* on *Rhododendron ponticum*, *Ascochyta asteris* on aster, *A. parasitica* on hollyhock, and *Septoria martianoffiana* on peony. New host records include *Claviceps purpurea* on *Bromus erectus*, *Puccinia iridis* on *Iris* spp., *Uromyces trifolii* on clover, *Fusicladium depressum* on carrot, and *Septoria gladioli* on gladiolus.

JANEŽIČ (F.). **Indeks rastlinskih bolezni v Sloveniji.** [Index of plant diseases in Slovenia.]—*Zborn. kmer. Gozd.*, **3**, pp. 39–86, 1957. [English summary. 13 refs.]

A list of 730 pathogens, arranged under 235 cultivated hosts, from Slovenia, Yugoslavia.

HANSFORD (C. G.). **Australian fungi. IV. New records and revisions (continued).**—*Proc. Linn. Soc. N.S.W.*, **82**, 2, pp. 209–229, 1 fig., 1957. [Received 1958.]

In this further contribution [**36**, p. 127] the author presents 53 fungi new for Australia, 35 of them being described as new species while 1 represents a new genus *Shawiella* (Phomales).

FREZZI (M. J.). **Especies de Pythium fitopatogenas identificadas en la República Argentina.** [Phytopathogenic species of *Pythium* identified in the Argentine Republic.]—*Rev. Invest agríc., B. Aires*, **10**, 2, pp. 113–241, 67 fig., 1 map, 1956. [78 ref. Received 1957.]

Descriptions are given of 17 spp. isolated from 140 host species in Argentina, with a key to their identification. *P. debaryanum* [map 208] and *P. ultimum* [**32**, p. 160], followed by *P. irregulare*, are the most widespread and the most commonly isolated from a large number of hosts. All were experimentally demonstrated to cause a rot of groundnuts in the Córdoba region: until Mar. these fungi are practically absent from the pods, but from Apr. onwards damage is increasingly severe, with losses above 50% in May, June, and July.

P. acanthicum (chestnut-coloured rot), *P. aphanidermatum* [map 309], *P. debaryanum*, *P. oligandrum* (chestnut-coloured rot), *P. periplocum*, *P. ultimum*, and *P. vexans* (chestnut-coloured rot) cause rotting of green and mature fruits in commercial water-melon crops. Where the crop is grown repeatedly and infection encouraged by irrigation, losses of 40% and sometimes 70% occur. Crop rotation is the only practical method of control.

P. debaryanum was demonstrated by inoculation to cause potato tuber rot, which is virulent. It occurred sporadically in Córdoba and in some tubers from Santa Fé.

P. dissotocum was associated with damping-off of white mulberry in a nursery. *P. aphanidermatum* caused pea root rot, killing about 40% of the plants at the Estación Experimental de Manfredi, Córdoba, and was associated with necrotic stem lesions and rotting of the entire root system of mature *Cereus aethiops* in a hothouse at the station: it was present with *Phytophthora parasitica* in necrotic strawberry roots, and was highly virulent to seedlings of *Ceratonia siliqua* growing in autoclaved soil.

Pythium torulosum was isolated only from diseased *Piptadenia rigida*. *Pythium intermedium* caused damping-off of the same host, chilli pepper, tomato, and white mulberry. *P. graminicola* [map 296] was isolated from dead and chlorotic arrowroot plants in a greenhouse at Alto Alberdi, Córdoba. *P. periplocum*, isolated in conjunction with *P. irregulare* from date palms with root rot at Estación Experimental Datilera de Quines, was virulent on both green and mature melon and water-melon fruits inoculated with a piece of potato glucose agar culture. *P. catenulatum* was associated with damping-off of tomato, eggplant, red pepper (*Capsicum annuum*), and *Cyamopsis tetragonoloba* and was pathogenic to all these when inoculated into the stems at soil level.

P. debaryanum was isolated from a rot of groundnut husks and kernels in several localities, from root rots of *Arachis pusilla* and *Cicer arietinum*, and from damped-off white mulberry, *Schinus molle*, and *Parthenium argentatum*. Pathogenicity for groundnut was confirmed by inoculation with pieces of potato glucose agar culture placed at scarified sites: necrosis appeared from the 4th–6th day, spreading to cover the fruits in 10–15 days.

Damped-off tomato and red clover and 18-month-old *Cupressus horizontalis* plants with all their roots rotted yielded *Pythium polymorphon*. *P. rostratum* was also present in damped-off tomato and white clover, and was associated with *P. irregulare* in damping-off of *Pinus halepensis*. *Pythium ultimum* [map 207], isolated from 82 hosts, especially seedlings, caused the death of mature hemp and coffee by killing all the roots. *P. vexans* [map 205] was isolated from severe root rot of *Begonia rex*. *P. irregulare* [map 206] caused root necrosis of various barley varieties at Manfredi; they were chlorotic, poorly developed, and partially or completely desiccated. Another strain of the fungus was pathogenic to oats and wheat, destroying entire root systems of 25-day-old plants following inoculation, and the radicles of 3-day-old plants. *P. irregulare* was responsible also for damping-off of tobacco and *Pinus pinea*, rot of young and mature groundnut pods, root rot and wilt of globe artichoke, root rot of mature kidney beans (*Phaseolus vulgaris*) and salsify, and root rot of mature pea plants.

Pythium mastophorum was isolated from severely damped-off parsley and cabbage at Manfredi, *P. oligandrum* from necrotic roots in various safflower lines imported from Nebraska, U.S.A., from severe root rot of mature plants of *Antirrhinum majus*, from *Phaseolus acutifolium* var. *latifolius* with root rot and stem necrosis, and from pea plants and 1–2-year-old apple trees with dead roots. When pieces of a 5-day maize meal agar culture were inoculated at ground level into 40-day-old safflower plants they wilted within 48 hours with moist brown necrosis at the site of inoculation; on the 4th day all were dead. *P. spinosum* caused

damping-off of *Gypsophila* sp. and eggplant; inoculation of the latter at ground level with a culture caused active necrosis and wilting of some plants in 48 hours.

CHEVAUGEON (J.). **Ceratocystis fimbriata Ellis et Halstead.**—*Rev. Mycol., Paris*, **22**, *Suppl. colon.* 2, pp. 45–60, 2 fig., 1957. [42 refs.]

A full account, based on the literature, is given of *C. fimbriata* [cf. **37**, p. 221 *et passim*] under nomenclature, geographical distribution, various plants attacked, symptoms on the different hosts, manner of penetration, transmission, morphological, cultural, and biological characters, and control of mouldy rot of the tapping panel of *Hevea* rubber [**36**, p. 209 *et passim*] and black rot of sweet potato [cf. **35**, pp. 710, 789, *et passim*].

VERNEAU (R.). **Nuovi ospiti di Macrophomina phaseolina e Sclerotium bataticola in Italia. Osservazioni e prove di inoculazione con Macrophomina phaseolina e Sclerotium bataticola.** [New hosts of *Macrophomina phaseolina* and *Sclerotium bataticola* in Italy. Observations on and inoculation tests with *Macrophomina phaseolina* and *Sclerotium bataticola*.]—*Ric. fitop. Campan.*, **13–14**, pp. 3–8; pp. 9–22, 1 pl., 1957. [English summaries.]

M. phaseolina [*M. phaseoli*: **27**, p. 388] as *S. bataticola* ssp. *intermedia* [cf. **28**, p. 84] was found in 1951 parasitizing *Ricinus* sp. at Foggia and *Centaurea imperialis* and *Zinnia elegans* at Salerno. This is the first record of the fungus on these hosts in Italy. *M. phaseoli* ssp. *typica* was found on beans [*Phaseolus vulgaris*] in the province of Caserta in 1950 and 1952.

In cross-inoculation experiments with 5 strains of the fungus from 2 vars. of beans, *Ricinus* sp., *Zinnia* sp., and *Centaurea* sp., all were pathogenic to beans, but maximum virulence was attained only on the host from which the strain had originally been isolated.

KUROSAWA (E.) & KATSUKI (S.). **Miscellaneous notes on Myriangiales from Japan. II.**—*Bot. Mag., Tokyo*, **69**, 817–818, pp. 315–318, 3 fig., 1956.

This annotated list contains 3 new species. The items include *Elsinoe randii* [**17**, p. 421, *et passim*] on *Juglans regia* var. *orientalis* and *J. mandshurica* var. *cordiformis*, *Sphaceloma catalpae* sp. nov. on *Catalpa speciosa*, and *S. punicae* [**22**, p. 180, *et passim*] on pomegranate.

LOWE (J. L.). **Polyporaceae of North America. The genus Fomes.**—*Tech. Publ. N.Y. St. Coll. For.* 80, 97 pp., 68 fig., 1957. $1.

After an introduction dealing with the economic importance, local geographical distribution, morphology of the sporophore, macroscopic and microscopic characteristics, and the nomenclature and taxonomy of the N. American representatives of *Fomes* [cf. **35**, p. 46] the author presents descriptive notes on 68 species, 7 of which are new to N. America, with keys; 34 omitted species are also noted and 3 comb. nov. are proposed, together with certain new synonymy.

FARINHA (MANUELA). **Contribuição para o estudo das Polyporaceae de Portugal.** [Contribution to the study of the Polyporaceae of Portugal.]—*Portug. Acta. biol.*, Sér. B, **6**, 1, pp. 4–25, 4 pl., 1955–7.

This is an annotated list of 30 recently found species [**34**, p. 549] included in the collection of the Dept of Mycology, Botanical Institute of Lisbon. These records, together with those previously published, are presented in 2 comprehensive tables indicating the geographical distribution and hosts of all the known Portuguese Polyporaceae with pileate carpophores.

Skovsted (A.). **The Thelephoraceae of Denmark. III. The Stereaceae.**—*C.R. Lab. Carlsberg*, Sér. Physiol., **25**, 17, pp. 389–417, 15 fig., 2 pl., 1956. [Received Feb. 1958.]

This monograph comprises descriptions of 2 spp. of *Podoscypha*, 14 of *Stereum*, and 3 of *Hymenochaete*, with keys to the genera and species.

Giolitti (G.) & Craveri (R.). **A method for isolating Streptomyces.**—*J. gen. Microbiol.*, **17**, 3, p. 649, 1 fig., 1957.

To isolate *Streptomyces* from sporulating cultures a small piece is cut out and placed on the bottom of the cotton-wool plug of a new agar slope. The tube is tapped while held at a very slight angle, and the plug then transferred to a second tube, the operation being repeated. A series of tubes bearing decreasing numbers of discrete colonies is thus obtained.

Popp (W.). **A new procedure for embryo examination for mycelium of smut fungi.** —*Phytopathology*, **48**, 1, pp. 19–22, 4 fig., 1958.

This technique, devised at the Plant Pathology Laboratory, Winnipeg, for demonstrating *Ustilago tritici* in wheat embryos, should be useful for other fungi in plant tissues. A special platform is mounted on the knife clamp of a Spencer rotary microtome to support the specimen and a device fixed in the jaws of the microtome head to hold a razor blade. A graduated cardboard disk on the handle of the microtome serves as a thickness gauge. The tissue is cleared in 12% ethanol containing 10% KOH [cf. **30**, p. 461], washed in water, treated with isopropyl alcohol containing 10% lactic acid, washed again, and embedded in a hard soap on a glass slide, using a glass ring as a mould and suitable adhesives. Sections (generally 20–25 μ) are taken singly, the soap dissolved in warm water, which is replaced by ethanol, and the sections then stained in 0·2% trypan blue in 45% acetic or lactic acid.

Advances in virus research. V.—ix+376 pp., 3 fig., 13 diag., 30 graphs, 1 map, New York, Academic Press Inc.; London, Academic Books Ltd., 1958. $9.50.

The current volume of this useful series [cf. **36**, p. 571] does not deal specifically with any aspect of plant viruses but students of that group will find the sections on the reproduction of bacterial viruses, by G. S. Stent (pp. 95–149), and the measurement of complement fixation by viruses, by F. Fulton (pp. 247–287), provide background reading.

Doerr (R.) & Hallauer (C.). **Handbuch der Virusforschung. Band 4 (III. Ergänzungsband).** [A handbook of virus research. Vol. 4 (Supplementary Vol. 3)]—xv+688 pp., illustrated, Vienna, Springer-Verlag, 1958. £12. 11*s*. 6*d*.

This supplement, like the previous one [**30**, p. 448], is of predominantly medical interest but students of plant viruses will welcome the detailed review by K. M. Smith of 'Arthropods as vectors and reservoirs of phytopathogenic viruses' (pp. 143–176) which concludes with a list of insect-transmitted viruses and a comprehensive bibliography. There is a complementary section on insects as vectors of animal pathogenic viruses and among other topics an interesting account of viruses of insects.

Kochman (J.) & Stachyra (T.). **Materialy do poznania chorób wirusowych roślin w Polsce.** [Data for the recognition of virus diseases of plants in Poland.]—*Roszn. Nauk. rol.*, 77–A–2, pp. 297–325, 6 fig., 1957. [13 refs. Russian and English summaries.]

This is an annotated list of 105 viroses, for the most part on cultivated plants, caused by 55 viruses, 44 of which are known and 11 are noted for the first time;

these are hop petiole crinkle, rhubarb mosaic [cf. **36**, p. 4], mahonia mosaic (on *Mahonia aquifolium*), chlorotic mosaics of *Aegopodium podagraria* and *Archangelica officinalis*, yellow vein necrosis of *Primula obconica*, mosaic of *Cerinthe glabra*, mottling of *Datura inoxia*, blister mosaic of *Inula helenium*, mosaic of *Silybum marianum*, and yellowing of *Matricaria chamomilla*.

Jamalainen (E. A.). **Virustaudeista ja virustautien kaltaisista kasvitaudeista Suomessa.** [Plant virus and virus-like diseases in Finland.]—*Valt. Maatalousk. Julk.* 158, 58 pp., 33 fig., 1957. [English summary. 47 refs.]

Some of the information in this useful report has already been noticed: other items include the following. Potato viruses X and S are co-extensive with the cultivation of the crop. Streak is the principal virus disease affecting tomato. Beet yellows virus [map 261] was first observed in the S.W. in 1947, but so far appears to be of little importance. Beans (*Phaseolus vulgaris*) suffer from bean mosaic [map 213] and bean yellow mosaic viruses. Fruit viroses include apple mosaic, pear dimpling (attributed to *Rimocortius pyri* [pear stony pit virus]), strawberry crinkle (on seedlings imported from abroad), and black currant reversion virus.

Urgent problems relating to the propagation of virus-free planting material are discussed.

Kahn (R. P.) & Libby (J. L.). **The effect of water and potassium phosphate buffer on plant virus infection prior to inoculation.**—*Phytopathology*, **48**, 1, pp. 57–60, 2 graphs, 1958.

This is an extended account of investigations at Fort Detrick, Frederick, Maryland, some of which have already been noticed [**34**, p. 279]. On a large population of Pinto beans [*Phaseolus vulgaris*] local lesion numbers were influenced both by the nature of the abrasive treatment and the type of inoculum (tobacco mosaic virus or bean southern mosaic virus), the max. number being obtained with dry abrasion and with 0·1 M phosphate buffer (pH7) [**37**, p. 149] added to the inoculum rather than at the time of abrasion. Dipping in phosphate or water between dry abrasion and inoculation was also influential; an inoculum diluted with phosphate buffer was more effective than if water-diluted and more so on leaves receiving no pre-inoculation dip, but a pre-inoculation dip in phosphate was more effective than a water dip.

The receptivity of leaves abraded dry at a series of time intervals of $\frac{1}{4}$–320 min. before inoculation decreased as this interval increased, but the leaves remained receptive for at least 80 min.; the rate of decrease was, however, much greater with a phosphate-diluted inoculum [cf. **36**, p. 374]. Neither dry abrasion nor abrasion with water or phosphate affected the length of the receptive period. The data obtained confirm previous findings that potassium phosphate in the inoculum results in more numerous lesions.

Yarwood (C. E.). **Heat activation of virus infections.**—*Phytopathology*, **48**, 1, pp. 39–46, 1 fig., 2 graphs, 1958.

In further studies at the University of California, Berkeley [cf. **36**, p. 294; **37**, p. 79] healthy, attached leaves and stems of apple, bean [*Phaseolus vulgaris*], cucumber, cowpea, peach, and sunflower were immersed in a water bath at 45, 50 or 55° C. for 2–500 sec., the green weight 10 days later forming an index of heat injury. The results are tabulated. The ED_{50} (period of heating for 50% reduction in green weight) of Pinto beans was some 300 sec. at 45° and 30 sec. at 50° at dawn, 72 sec. at 50° in late afternoon, and 10 sec. at 55° at dawn, growing points being more sensitive to heat than primary leaves or cotyledons, and injury greater in plants exposed to bright light immediately after heating than to darkness, and in leaves orientated towards the sun than away from it.

Delay in appearance of necrotic lesions resulted when bean, cowpea, or cucumber plants, each infected by tobacco mosaic, tobacco ring spot, [tomato] spotted wilt, peach yellow bud mosaic, or apple mosaic viruses, were heated for 20 sec. at 50° between 6 hr. and 3 days after inoculation. Heating induced more and larger lesions and increased the number of systemic infections. Although peach ring spot virus induced no local lesions on unheated bean leaves, heating for 30 sec. at 50° induced lesions, which increased in size as heating was delayed for 2–11 days after inoculation. Similarly, systemic infection by tomato spotted wilt virus, rarely induced in unheated Pinto bean leaves, occurred commonly after 30 sec. at 50° on the second day after inoculation. Heating only the inoculated leaf generally induced systemic infection. Dry heat, obtained by covering the leaves with plastic, prevented the formation of tobacco mosaic virus lesions on beans exposed to 50° for 40 sec. immediately after inoculation, but 30 sec. after 5 hr. increased the number of lesions compared with the controls, as did the wet treatments.

It is suggested that ordinary inoculation with a virus produces more local infections than lesions, and that heating activates many of these latent infections, probably as a result of heat injury to the host. Use of the method to induce lesions or systemic infection on hosts where these do not normally occur is suggested.

Yarwood (C. E.). **Mechanical transmission of fruit tree viruses.**—Abs. in *Proc. Canad. phytopath. Soc.*, **25**, pp. 19–20, 1957.

If the rubbing of host sap on a suscept dusted with an abrasive is accepted as a standard method of inoculation, some of the factors believed to influence the success of inoculations with fruit tree viruses are: choice of inoculum; choice of suscept; longevity and activity of the virus; water effect; heat effect [see above]; and diurnal periodicity.

Young, succulent leaf tissue in spring is usually best for original inoculum. Twig tissues of dormant trees in winter have served as successful inocula with Tulare apple mosaic virus, peach yellow bud mosaic virus, and peach ring spot virus, but were less infective than young leaf tissue. Petal tissue was occasionally better than leaf tissue. Tissue of herbaceous plants was more infective than fruit tree tissue. The upper epidermis of infected tobacco was a richer source of apple mosaic virus than the lower.

Herbaceous plants are usually more readily infected with fruit tree viruses than are fruit trees. With both, very young plants are the most susceptible. As a rule, better infection results if the inoculum is applied to the upper leaf surface, but with peach yellow bud mosaic virus, inoculations on peach and sunflower were more successful on the lower surface and upper stems than on the upper leaf surface.

Fruit tree viruses are usually shorter-lived than viruses of herbaceous plants. The longevity or the infectivity of the virus (or both) may be increased by extracting sap with water or aqueous solutions of dipotassium phosphate, sodium sulphite [see next abstract], or cysteine hydrochloride. Loss of infectivity with time may sometimes be avoided by rapid inoculations, e.g. the cut edges of infected leaves are rubbed directly on the suscept [cf. **33**, p. 203], or a stiff brush may be stroked over the donor host and then over the suscept [**37**, p. 149]. With either method the time between the extraction and introduction may be under 3 sec.

With inoculations of apple mosaic virus and peach yellow bud mosaic virus to bean [*Phaseolus vulgaris*] and cowpea [see above], heavier infection resulted if the inoculated surface was dried quickly after inoculation [cf. **35**, pp. 865, 903].

When bean or cowpea leaves were heated for 20 sec. at 50° C. before or several hr. after inoculation, infection by a number of viruses was increased [cf. **36**, p. 294]. Inoculations of apple mosaic virus, peach yellow bud mosaic virus, and peach ring spot virus were more successful in the afternoon than in the early morning.

WILLISON (R. S.), WEINTRAUB (M.), & FERGUSON (J. D.). **Purification and electron microscopy of viruses causing Cherry yellows and related diseases.**—*Canad. J. Bot.*, **34**, 1, pp. 86–103, 1 pl., 16 graphs, 1956.

This further study from the Plant Pathology Laboratory, St. Catherines, Ontario [cf. **34**, p. 304] concerns the purification and concentration by differential centrifugation from cucumber leaves and/or peach and cherry petals of virus entities associated with cherry necrotic ring spot [peach ring spot virus], sour cherry yellows, sour cherry green ring mottle [sour cherry yellows virus (str.)], cherry tatter leaf [peach ring spot virus], prune dwarf, and rose mosaic and an unspecified virus from rose [**37**, p. 149]. The *Prunus* tissues were homogenized with 0·1% potassium cyanide in 2·5% sodium bisulphite. Other infective extracts were prepared by ammonium sulphate precipitation and from aqueous chloroform-amyl-alcohol emulsion. In centrifuged extracts from healthy tissues particles ranged from 10 to over 100 mμ diam., distributed about a series of peaks at 10 mμ intervals. From the diseased tissue distribution was about a specific mode. Particles from different entities ranged from 28 mμ diam. for rose mosaic virus to 50 mμ for some of the tatter leaf and green ring mottle isolates. Where two viruses were present in an extract and the mean particle diam. of one was known and differed from the other by 5 mμ or more, characteristic distributions of the two could be determined. Particle characters, together with those of cross protection and symptoms, suggested that peach ring spot virus is not necessarily involved in the etiology of the other *Prunus* diseases investigated.

THORNBERRY (H. H.). **A method for isolating virus-like particles from woody plants showing symptoms of Elm phloem necrosis, Peach X-disease, and Cherry ring spot.**—*Phytopathology*, **48**, 1, pp. 15–19, 1 fig., 1958. [21 refs.]

This method, used at the University of Illinois, Urbana, for isolating virus-like particles from foliage of woody plants, combined 3 salient features: dilutive extraction of aqueous soluble substances from the ground tissues, clarification of the crude sap by filtration through a celite cake, and adsorptive fractionation of amphoteric substances and their subsequent elution with a reduced volume of buffer. The whole procedure is shown in a flow chart.

Dilutive extraction at pH 8·5 favoured solution and lowered the viscosity of extracts; filtration at pH 8·5 separated solutes and negatively charged particles below bacterial size from larger solids, positively charged particles, or gummy substances, which were retained by the celite cake. Adjustment of the clarified filtrate to pH 3·5 for adsorptive filtration resulted in retention of positively charged particles and aggregates which were separated from the celite by elution at pH 8·5 and paper filtration.

The final preparations after ultracentrifugation contained particles 50 mμ diam. from elm with symptoms of elm phloem necrosis virus and from choke cherry (*Prunus virginiana*) with peach X-disease virus and of 80 mμ diam. from sour cherry with cherry [peach] ring spot virus [cf. above]. A preparation from a leafhopper (*Colladonus geminatus*) carrying peach western X-disease virus contained 50 mμ particles. No infection could be detected in inoculation tests with the preparations, but the particles have diagnostic value as disease indicators.

DESROSIERS (R.) & DIAZ (J.). **Enfermedades del Cacao y su control.** [Diseases of Cacao and their control.]—*Bol. Ext. Serv. co-oper. Interamer. Agric.* 1, 29 pp., 6 fig., 1956. [Received 1957.]

This bulletin replaces the Boletín de Información No. 22 issued in 1953 and contains a description of the most important diseases affecting cacao in Ecuador together with a guide to their control [**31**, p. 56; **35**, p. 882; **36**, p. 459; **37**, p. 220].

Fortschritte in der Bekämpfung saatgutübertragbarer Getreidekrankheiten. [Progress in the control of seed-transmissible cereal diseases.]—*Jb. bayer. Landw.*, **34**, Sonderheft 2, 44 pp., 7 fig., 1957.

This is a report of a conference on smut diseases held at Giessen, Germany, 18 Jan., 1957, on the occasion of the general meeting of the Working Party for Disease Control and Breeding for Resistance in Cereals and Legumes. E. Niemann (pp. 6–7) referred to his work on the transmissibility of *Tilletia foetida*, *T. caries*, and *T. contraversa* to gramineous hosts other than the one from which they were isolated, stating that in 100 test series of inoculations at Kiel-Kitzeberg there were very few successes, and then only in individual cases. He concluded that in Europe and Asia Minor these fungi are highly specialized and only exceptionally transmitted from one host species to another [cf. **36**, p. 387]. H. Aebi (pp. 8–14) reported from Lausanne the results of studies on the host range of strains of *T. brevifaciens* and *T. contraversa* from various sources, particularly their reactions on wheat-rye hybrids, from which he concluded that the agent of dwarf bunt is distinct from both *T. contraversa* and *T. secalis* [cf. **35**, p. 597]. F. Wagner (pp. 15–17) reported field reactions over two seasons in Munich and Bayreuth of 15 German and 3 American wheat varieties to bunt [*T. caries*] and dwarf bunt [*T. contraversa*: **36**, p. 696]: only Relief and Wasatch were completely immune from both.

F. Pichler (pp. 18–24) discussed the results of experiments already noticed on the physiology of the warm-water treatment for loose smut of wheat and barley [*Ustilago nuda*: **35**, p. 884]. E. Niemann (p. 25) discussed the practicability of using in Germany the cotton-blue method for the demonstration of loose smut infection in grain to be used for experimental purposes. F. Pichler (pp. 26–29) considered the epidemiology of snow mould (*Fusarium nivale*) [*Calonectria nivalis*] of winter rye in Austria and reported successful control in susceptible varieties such as Petkus by application to the soil after cultivation or after sowing of mercury compounds, PCNB, or 'P' (origin unspecified, composition still secret), which is superior to brassicol super. F. Wagner (pp. 30–36) reported that in tests in 4 localities in the Bavarian mountains spraying of the soil with brassicol super (16–20 kg./ha.) gave yields of Petkus winter rye ranging from 27–47 dc./ha., compared with 0–24 in the untreated, under conditions in which, following a snow cover lasting up to 4½ months, control crops were completely destroyed by snow mould [**35**, p. 520]. H. E. H. Müller (pp. 37–42), after pointing out that infection of wheat and barley by *Helminthosporium sativum* [*Cochliobolus sativus*] is of far greater importance in N. America than in Europe [cf. **36**, p. 581], concluded that climatic factors are responsible.

Andrén (F.). **Betningsförsök med stråsäd.** [Disinfection experiments with cereal seed.]—*Vaxtskyddsnotiser, Stockh.*, **21**, 3, pp. 47–50; 4, pp. 55–57, 1957.

During the seasons (1954–56) covered by these reports [cf. **34**, p. 140], adverse weather conditions hampered experimental work, and the results of the cereal seed disinfection tests were not uniformly reliable. They are published, therefore, only for the sake of continuity in the records of the Växtskyddsanstalt. On the whole, pure mercurials were the most effective, though thiram preparations seemed to exert a more favourable influence on germination and further acted specifically against infection by *Penicillium*.

Djiembaev (J. T.). Болезни твердой Пшеницы на севере Казахской С.С.Р. и борьба с ними. [Diseases of hard Wheat in North Kazakh S.S.R. and their control.]—Тр. Респ. ст. защиты раст. Казахск. фил. ВАСХНИЛ [*Trud. Resp. st. Zashch. rast. Kazakh. fil. VASKNIL*], **3**, pp. 171–191, 1956. [Abs. from *Referat. Zh. Biol., 1957*, 18, p. 182, 1957.]

At the Shortandinskaya Experimental Station, U.S.S.R., studies from 1949–51

on wheat diseases showed that root rot (*Helminthosporium sativum*) [*Cochliobolus sativus*] is especially prevalent in dry summers. Black mould or cladosporiosis [*Cladosporium* sp.] reached epidemic proportions in the wet year 1949. Fusariosis [*Fusarium* sp.], bunt [*Tilletia caries*: **36**, p. 462], and dwarf bunt [*T. contraversa*] were isolated during the early growing period. Brown rust [*Puccinia triticina*: **36**, p. 481] and wheat streak mosaic virus were also prevalent in 1949. Measures for their control are given.

Agarkov (V. A.). Вирусные болезни Пшеницы в Винницкой области [Virus diseases of Wheat in the Vinnitsa district.]—*Plant Prot. Leningr.*, *1956*, 3, pp. 31–34, 1956. [Abs. from *Referat Zh. Biol.*, *1957*, 16, p. 186, 1957.]

Three virus-like diseases are described, the first occurring in spring, arresting growth and producing yellowing of the seedlings; the second in the flowering period of healthy plants, bringing about sterility and causing the production of shoots and small leaves from the spikes; the third, occurring during earing of winter wheat, is characterized by longitudinal, whitish-yellow stripes on the leaves, with a bushy appearance of the ears. The author considers that the first is caused by soil-borne wheat mosaic virus [**35**, p. 480]; the other 2 are transmitted by a vector.

Peturson (B.). **Wheat rust epidemics in Western Canada in 1953, 1954 and 1955.**—*Canad. J. Pl. Sci.*, **38**, 1, pp. 16–28, 3 maps, 1958.

An account is given, from the Canada Dept Agric., Winnipeg, of the factors influencing the development of *Puccinia triticina* and *P. graminis*, including the origin of inoculum and time of infection, degree of resistance of the predominant varieties, weather, and time of sowing [cf. **23**, p. 433; **24**, p. 309], with losses incurred over the 3 years in question, assessed by comparison of yields of susceptible and resistant varieties. In 1953, with early arrival of inoculum and abnormally wet weather, losses were the highest since 1935, while in 1954 late sowing, excessive rainfall, and considerable influx of inoculum into Saskatchewan, the main wheat growing area, caused the worst rust epidemic on record. In 1955 rain, late sowing, and arrival of abundant inoculum in Manitoba initiated another epidemic, but dry, hot weather in mid-July hastened maturity, and this, together with the presence of much Selkirk, resistant to both rusts, and Lee, resistant to *P. triticina*, which together limited the increase of inoculum, reduced losses. It was estimated that wheat yields were reduced by some 45 million bush. in 1953, 150 million in 1954, and 9 million in 1955.

Athwal (D. S.) & Watson (I. A.). **Inheritance of resistance to Wheat leaf rust in Mentana, a variety of Triticum vulgare.**—*Proc. Linn. Soc. N.S.W.*, **82**, 2, pp. 245–251, 1957.

Gabo, Warigo, Glenwari, and Spica, the only commercial wheat varieties which have been selected for resistance to leaf rust (*Puccinia triticina*) [see below], are now all susceptible, owing to the occurrence of new races. Certain varieties have maintained their resistance over a long period in spite of changes in the rust flora, Mentana being outstanding as a source of resistance to all Australian races. Back-cross lines, using several of the leading varieties in Australia as recurrent parents, are now available, and seem to possess the resistance of Mentana. In the course of the breeding programme at the University of Sydney with the cross Federation ×Mentana a strong correlation was found between seedling reaction to race UN 12 and mature plant reaction to a group of races. Resistance is governed by two linked factors (Mt_1 and Mt_2) which are recessive in the seedling stages but the former reverts to a dominant at maturity.

Athwal (D. S.) & Watson (A. I.). **Inheritance studies with certain leaf rust resistant varieties of Triticum vulgare Vill.**—*Proc. Linn. Soc. N.S.W.*, **82**, 2, pp. 272–284, 1957.

Further studies [see above] of resistance to leaf rust (*Puccinia triticina*) in the wheat vars. Uruguay 1064, Chinese Spring 1806, and Kenya 744 revealed in the 2 first-mentioned identical factors (Cw_1, Mt_2) for mature plant resistance. Uruguay also possesses a factor for physiological resistance and Kenya 744 one dominant for moderate resistance (Kb_3) to race U 12. Three factors in these varieties have been found to be conditioned at independent loci and are also non-allelic to either of the two linked factors (Mt_1, Mt_2) present in Mentana 1124. Uruguay and Chinese Spring were highly resistant to leaf rust in the field, while Kenya 744 bore a varying amount of infection dependent on the prevalence of the races to which it is susceptible.

It is concluded that Uruguay, in addition to physiologic resistance, possesses mature plant resistance to all races of leaf rust prevalent in Australia, the resistance to each being determined by a single dominant factor. The factor controlling the physiological type of resistance (Ug_1) was operative against all races except UN 14; when this was present in sufficient proportion the field resistance of Uruguay was governed by a single factor, but otherwise 2 factors appeared to be operative.

Hassebrauk (K.). **Die physiologische Spezialisierung des Weizenbraunrostes (Puccinia triticina Erikss.) in Deutschland und einigen anderen westeuropäischen Staaten im Jahre 1956.** [Physiological specialization of Wheat brown rust (*Puccinia triticina* Erikss.) in Germany and some other West European countries in 1956.]—*NachrBl. dtsch. PflSchDienst* (*Braunschweig*), *Stuttgart*, **9**, 12, pp. 182–83, 1957.

The samples of *P. triticina* examined at the Institut für Physiologische Botanik, Brunswick, in 1956 [cf. **37**, p. 31] were from Germany (126 from 83 localities), Holland (19, 6), France (33, 5), Sweden (5, 2), Denmark (3, 1), and Great Britain (3, 2). Races 1, 14, 17, 20, 49, 52, 53, 57, 93, 107, 128, 129, and 155 were present, and also the new race first encountered in 1954 [loc. cit.]. Two distinct biotypes of several races were isolated. Race 17 was predominant, while 52 showed a surprisingly large increase over the previous year. Race 1 had practically disappeared and the others occurred only in isolated instances; 49, 128, and 129 are new to Germany.

Baylis (R. J.). **Studies of Tilletia controversa, the cause of dwarf bunt of winter Wheat.**—*Canad. J. Bot.*, **36**, 1, pp. 17–32, 1 pl., 16 graphs, 1 map, 1958.

In this contribution from the Canada Dept Agric., Ottawa, it is noted that *T. contraversa* [cf. **36**, p. 392, *et passim*] has become widespread in Ontario since it was first observed there in 1952 [**32**, p. 471] and, though not severe, is of concern to growers of seed wheat. The chlamydospores require 3 weeks or more incubation at low temp. before germinating, 8 weeks at 5° C. being optimum to produce the max. germination (50%); continued temps. above or below this considerably reduce infection. Exposure to light is necessary, but if sensitized for a week in light, chlamydospores will germinate in darkness when other conditions are favourable. Slight soil acidity and adequate, but not excessive soil moisture are favourable to germination. Infection is most likely to occur at or near the soil surface from spores suitably conditioned; they can survive at least 3 years in the soil. Correlation exists between temp., light, soil moisture, and the degree of severity of the disease [**35**, p. 8].

Zogg (H.). **Studien über die biologische Bodenentseuchung. I. Einfluß der Bodenmikroflora auf Ophiobolus graminis Sacc. (Methodik).** [Studies on the biological decontamination of the soil. I. Influence of the soil microflora on *Ophiobolus*

graminis Sacc. (Technique).]—*Phytopath. Z.*, **30**, 3, pp. 315–326, 3 fig., 3 graphs, 1957. [English summary. 62 refs.]

At the Eidgenössische Landwirtschaftliche Versuchsanstalt, Zürich, the following method was used for the estimation of the biological activity of a soil microflora in relation to the elimination of wheat root rot pathogens, especially *O. graminis* [cf. **29**, p. 93 *et passim*], which was cultured in 300 ml. sealed flasks on terralit (a material resembling vermiculite) with the addition of ground wheat straw and a nutrient solution. When the medium was well permeated, samples of unsterilized soil were added and formalin-treated seed, e.g. rape or clover, planted. After growth in the laboratory under light the green parts of the plants were removed and the flasks resown if necessary. Alternatively roots with their rhizospheres were cut off, macerated, and placed in the flasks. After reaction periods of 2, 4, or 24 weeks the green parts were removed and germinated wheat seed, treated with hot water or formalin, was added to the flasks. Disease indices were estimated 2–3 weeks after planting [cf. **36**, p. 641].

There was a good correlation between the results of these tests, field experiments reported by other workers, and practical experience. The unsterilized, root-free soil from fields with no susceptible grain crops acted as in the field, i.e., the effects of *O. graminis* were almost entirely lost after a period of weeks; they were partially retained by the use of soil in which susceptible cereals had been grown, e.g. 25·8–43·6% infection occurred in seedlings from wheat sown in the soil after periods of up to 24 weeks. After 8 months' growth of rape or clover in unsterilized soil the disease indices for wheat seedlings were 14·7 and 15·4%, respectively. In another experiment the incidence of infection by *O. graminis* on wheat seedlings from soil in which wheat had been grown for 21 weeks was 53·4% but with rape it was 4·8%.

Russell (R. C.). **Longevity studies with Wheat seed and certain seed-borne fungi.**—*Canad. J. Pl. Sci.*, **38**, 1, pp. 29–33, 1 fig., 2 graphs, 1958.

At the Canada Dept Agric., Saskatoon, Saskatchewan, wheat grain with cracked surfaces, stored for 17 years [cf. **22**, p. 55; **31**, p. 596], averaged initially 4% lower germination than sound grain, fell to 12% less in the first 4 years, remained so for some years, and finally was little different. All the seed germinated well for some 8 years, after which viability decreased rapidly to the 15th year, then more slowly, until after 17 years nearly all the seed was dead. Of two seed-borne fungi investigated, *Alternaria tenuis* had disappeared in 7 years or so, but 8% of the original amount of *Helminthosporium sativum* [*Cochliobolus sativus*] was still present at the end.

Van Sumere (C. F.), Van Sumere-de-Preter, Vining (L. C.), & Ledingham (G. A.). **Coumarins and phenolic acids in the uredospores of Wheat stem rust.**—*Canad. J. Microbiol.*, **3**, 6, pp. 847–862, 1 pl., 1957. [42 refs.]

Further to investigate the self-inhibition of spore germination of *Puccinia graminis* [cf. **35**, p. 172; **36**, p. 340, *et passim*] at the Prairie Regional Laboratory, Saskatoon, Saskatchewan, and in view of the known implication of coumarin in seed germination and dormancy, references to which are cited, a paper chromatographic method was developed for the identification of the coumarins and phenolic acids present in the uredospores of *P. graminis*. By using the circular technique and a combination of 3 different solvent systems an adequate separation of all the substances was effected. Uredospores were germinated by flotation en masse on dilute, aqueous solutions of the compounds, 6 of which markedly stimulated germination, while 5 others had only a slightly stimulatory effect or were strongly inhibitory.

The inhibitory substances found were not, however, volatile, as the inhibitor previously found has been shown to be, nor for the most part active at very low concentrations. The stimulation of germination may possibly be attributable to the

counteraction of an undetected self-inhibitor released by the spores in contact with water by an aerobic process. That some substances could overcome the inhibitor was unexpected, and their mechanism of stimulating germination is unknown, but they are sufficiently dissimilar in chemical structure to make a purely chemical interaction unlikely. Indoleacetic acid may play a part in the physiology of uredospore germination. The mediating effect of phenolic compounds at the level of indoleacetic acid formation and degradation would also explain the action of the other stimulatory substances. The view that the influence of indoleacetic acid on germination is due to a reversal of the depression caused by the self-inhibitor is supported by the fact that the level of auxin required for maximum stimulation varied with spore concentration.

Coumarin and the phenolic compounds formed by the rust may play an important part in the physiological effects of attack on the host through the effect they exert on indoleacetic acid metabolism. The production by the fungus of compounds stimulating the formation and retarding the breakdown of indoleacetic acid (or having the latter effect only) may explain the increased metabolism and migration of nutrients observed by Shaw and Samborski [**35**, p. 915] at infection loci in susceptible hosts. Resistance might also be regarded as due to the ability of the host to neutralize the phenolic substance produced by the rust either by specific oxidases or glycoside formation. Alternatively, the growth of the fungus in a host with a high endogenous concentration of these compounds might rapidly establish toxic levels at the site of infection, ultimately causing the death of both the host cells and the parasite.

Shaw (M.) & Hawkins (A. R.). **The physiology of host-parasite relations. V. A preliminary examination of the level of free endogenous indoleacetic acid in rusted and mildewed cereal leaves and their ability to decarboxylate exogenously supplied radioactive indoleacetic acid.**—*Canad. J. Bot.*, **36**, 1, pp. 1–16, 8 graphs, 1958.

In a further contribution to this series [cf. **37**, p. 224], from the University of Saskatchewan, Saskatoon, the results are presented of a study of the indoleacetic acid content and oxidase activity of Little Club and Khapli wheat leaves inoculated with race 15 B of *Puccinia graminis* and Atlas and Gatami barley leaves inoculated with race 3 of *Erysiphe graminis*. The growth substances were extracted from infected and control first seedling leaves with cold alcohol, the acid ether fractions chromatographed, the chromatograms sectioned, and the sections assayed for growth promoting or inhibiting activity by the *Avena* coleoptile straight growth test (*J. exp. Bot.*, **6**, pp. 129–151, 1955). The estimated free, endogenous indoleacetic acid content of healthy leaves ranged from 0·5–3·2 μg./kg. fresh wt. Soon after infection this decreased, but by the 10th day after inoculation of susceptible hosts increased again to 5–10 μg. Indoleacetic acid was not detected in ungerminated uredospores of *P. graminis* [cf. above], but 2 other growth promoting substances appeared to be present.

To study the decarboxylation of indoleacetic acid ('oxidase' activity) leaf disks were incubated with radioactive indoleacetic acid (as $-C^{14}OOK$) and the radioactivity released as $C^{14}O_2$ was measured [cf. **37**, p. 224]. Decarboxylation increased sometimes by 1,000% in the first 3 days after inoculation, after which in susceptible hosts it decreased sharply to less than 50% of the values for healthy tissue; in infected, resistant tissue this decrease was delayed and less marked.

Concluding a detailed discussion of the results of relevant observations by other workers in the light of their own results the authors suggest that the genetic control of resistance, where resistance can be experimentally broken, may, in fact, mean control of the internal factors in the 'oxidase' system which govern auxin balance.

Gorter (G. J. M. A.). **A new physiologic race of Erysiphe graminis hordei Marchal.**—*S. Afr. J. Sci.*, **53**, 17, pp. 443–445, 1957.

A new race (S.A.1) of barley mildew (*E. graminis*) [cf. **36**, pp. 18, 685, *et passim*], found in the Transvaal, is closely related to the North American races 8 and 14, but differs from them in its reactions on Batna C.I. 3391 (susceptible) and Roho C.I. 3573 (highly resistant).

A change in the analytical key for the differentiation of races is suggested in order to put less emphasis on Black Hulless, which proves to be a poor differential variety. In the new key precedence is given to Goldfoil, Heils Hanna 3, and Chevron.

Wells (S. A.). **Inheritance of reaction to Ustilago hordei (Pers.) Lagerh. in cultivated Barley.**—*Canad. J. Pl. Sci.*, **38**, 1, pp. 45–60, 1958.

At the Canada Dept Agric., Lethbridge, Alberta, 4 genes (2 dom., 2 rec.) for resistance [**35**, p. 441] were found in 5 varieties studied. The 2 dominants were combined in Anoidium and a dominant and recessive in Ogalitsu. The only linkage found between resistance and morphological characters was that awn barbing was located in group I.

Clark (R. V.). **The evaluation of variability in pathogenicity of Helminthosporium sativum and the relation of temperature to disease development on Barley.**—*Diss. Abstr.*, **17**, 2, pp. 220–221, 1957.

At the University of Wisconsin a comparison of the relative pathogenicity of 50 isolates of *H. sativum* [*Cochliobolus sativus*: **36**, p. 757] on 6 barley varieties in the greenhouse showed differences in development of seedling blight and root rot. In the course of field tests with 5 of these isolates, differences of pathogenicity were observed. Most of the varieties studied were susceptible to spot blotch.

With each subsequent generation of sub-culturing of monoconidial cultures of 2 of the 3 isolates the mean square values for differences in pathogenicity between cultures were reduced; the 3rd showed a significant increase in the 3rd generation. Variations occurred in the amount of pigmentation, production of aerial mycelium, and growth rate from the 1st generation of each isolate, but these differences were considerably smaller in the 2nd and 3rd generation.

Approximately 125 single conidia from each culture within 3 monoconidial lines were subcultured, but these did not show any significant differences in cultural characters. A comparison made on 2 barley varieties in the greenhouse of the pathogenicity of 20 of the subcultures taken at random from each isolate showed no great difference between the cultures from 2 of the 3 isolates. The 3rd, derived from a varying culture, gave a range of pathogenicity.

Leaf lesioning and necrosis developed rapidly from 24–28° C. with max. severity at 28° on seedlings of 6 varieties. Seedling blight and root rot was severe from 8–28° with a max. rate of development usually at 20°. Within and between the experiments considerable shifting in reaction of the isolates and in response of varieties in the development of seedling blight and root rot occurred.

Campbell (W. P.). **Varietal differences in reaction of Barley to Claviceps purpurea (Fr.) Tul.**—Abs. in *Proc. Canad. phytopath. Soc.*, **25**, p. 13, 1957.

At the Plant Pathology Laboratory, Edmonton, Alberta, 11 barley varieties were inoculated with conidial suspensions of *C. purpurea* [**35**, p. 157, *et passim*], in the greenhouse by injection into the florets and in the field by spraying the plants. The inoculations were made on the day the plant headed and on alternate days thereafter for 10 days. The length of time during which the host remained susceptible after heading appeared to have an important bearing on the amount of infection that developed in the field.

Peturson (B.). **Physiologic races of crown rust in Canada 1929 to 1956.**—Abs. in *Proc. Canad. phytopath. Soc.*, **25**, p. 16, 1957.

At the Plant Pathology Laboratory, Winnipeg, 45 races and biotypes of *Puccinia coronata* [cf. **36**, pp. 176, 396, 686] have been identified on oats since 1929 in Canada. Up to 1945 most isolates were of races non-pathogenic to varieties with the Bond type of resistance, but in that year races pathogenic to these began to increase, and since 1950 have comprised about 60% of all isolates. The increase coincided with the expanse in the acreage of these varieties in the United States.

Races 239 and 240, non-pathogenic to Bond, prevail in eastern Canada. Races 201, 202, and 202 A, pathogenic to Bond, predominate in western Canada and are common in eastern Canada. In 1956 race 263 was found in 2 localities and race 276 in 1; both are pathogenic to all oat varieties now being used in Canada in breeding for resistance to crown rust.

Reyes (G. M.). **Recent outbreaks of Maize rust in the Philippines.**—*F.A.O. Pl. Prot. Bull.*, **6**, 3, pp. 39–40, 1957.

Whereas *Puccinia sorghi* has long been known in the Philippines [**3**, p. 716] and does little harm, *P. polysora* [map 237], first observed in 1948, has since caused serious losses in various areas. Resistant maize vars. are being sought.

Jennings (P. R.) & Ullstrup (A. J.). **A histological study of three Helminthosporium leaf blights of Corn.**—*Phytopathology*, **47**, 12, pp. 707–714, 3 fig., 1957.

Further studies by Purdue University, Lafayette, Indiana, with the U.S. Dept Agric. [cf. **36**, p. 758] concerned the host-parasite relations of maize and *H. turcicum*, *Cochliobolus heterostrophus*, and race 1 of *H. carbonum*, and histological differences between resistant and susceptible inbred lines. *H. turcicum* became established in the xylem, to which it largely remained confined. Absence of pectin plugs from diseased material and impeded water movement observed with the aid of eosin indicated that the resultant blight is essentially a wilt disease induced by mycelial plugging of the vessels. The fungus reacted similarly on other hosts, including varieties of sorghum and Sudan grass. Resistance, indicated by the inhibition of mycelial growth, appeared to be located in the xylem, and increased with the age of the plants.

C. heterostrophus spread rapidly through the chlorenchyma, but vascular tissue was not invaded and the larger bundles blocked lateral growth. In resistant lines growth was checked in the chlorenchyma, inhibition increasing with age of the plant.

H. carbonum behaved similarly; in resistant varieties penetration did not generally extend beyond the epidermis and hyphae entering the stomata were checked in the substomatal cavities.

Moll (R. H.). **The inheritance of brown spot resistance in Corn.**—*Diss. Abstr.*, **17**, 8, p. 1648, 1957.

A study at N. Carolina State College of the inheritance of resistance to brown spot [*Physoderma maydis*: **35**, p. 763] in maize and of the partitioning method of genetic analysis proposed by Powers, Locke, and Garrett in 1950, indicated that at least 4 loci influence resistance. There was also evidence that epistasis is involved. It appears that the disease reaction of single crosses cannot be predicted from the reaction of inbred lines.

Petróczy (I.). **Epicoccum okozta foltosság a Kukorica levelén.** [*Epicoccum* leaf spots on Maize.]—*Agrártud. egy.*, **2**, 3, pp. 3–7, 4 fig., 1955. [Russian and German summaries. Received Jan. 1958.]

In the Kaloch region on the Danube, Hungary, an unknown disease attacked maize

leaves in 1952. The isolated organism, which produced round, red-bordered blotches 0·4–0·6 cm. diam. on the younger leaves, and brownish-grey blotches on the older ones, proved to be *Epicoccum* sp.

Lingle (J. C.) & Holmberg (D. M.). **The response of Sweet Corn to foliar and soil zinc applications on a zinc deficient soil.**—*Proc. Amer. Soc. hort. Sci.*, **70**, pp. 308–315, 3 fig., 3 graphs, 1957.

Greenhouse pot tests were conducted at the University of California to identify an unknown deficiency condition of sweet corn prevalent in the State, later ascertained to be Zn deficiency [cf. **35**, p. 486]. Leaf symptoms resembled those of 'white bud' [**16**, p. 32], except that the young leaves were not immediately affected. A light, interveinal striping similar to that caused by Mn deficiency [cf. **18**, p. 307] was noted first. This increased until a broad, bleached band several veins wide had developed, beginning at the base and proceeding towards the tip; the midrib and margin remained green. All the affected plants were stunted, mainly owing to the greatly shortened internodes. Many tassels had no anthers, and in other Zn-deficient plants the anthers were much less profuse than is normal. This symptom was observed on field maize in some areas. The silks emerged only after all the pollen had been shed, with resultant poor pollination.

Ravisé (A.). **La mycoflore du Riz irrigué en Afrique Occidentale.** [The mycoflora of irrigated Rice in West Africa.]—*Riz et Rizic.*, **3**, 4, pp. 129–138, 9 fig., 1957. [English and German summaries.]

Notes are given on 34 fungi found on irrigated rice in 1954–5 in the lower Ivory Coast (Adiopodoumé), Upper Guinea (Kankan), Casamance (Sefa), and Senegal (Richard Toll); material from the central Nigerian delta (Segou and Kokry) was also examined.

Choanephora cucurbitarum [cf. **34**, pp. 724, 804] was often associated with infection by various species of *Fusarium* in the lower Ivory Coast, increasing the damage. At Richard Toll, *Rhizopus nigricans* [*R. stolonifer*: cf. **36**, pp. 343, 760] was found on 34% of spotted seeds (about 3/1,000) of the Sossoka variety. *Aspergillus niger* [**36**, p. 457] developed on seeds put to germinate. *Gibberella fujikuroi* [cf. **36**, p. 724] was profuse only on the host tissues in the thickly forested area of the Ivory Coast. *Leptosphaeria oryzina* [**34**, p. 259] was found only, and not often, in the dense forest area [of the Ivory Coast: loc. cit.].

The development of *Linocarpon oryzinum* [*Ophiobolus oryzinus*: **33**, p. 445] results from defective irrigation; the fungus appears not only on young plants but also on nearly 20% of those at the end of growth. False smut (*Ustilaginoidea virens*) [cf. **35**, p. 230], usually non-virulent and almost always rare, is of real economic importance in the dense forest areas bordering on the Gulf of Guinea. *F. nivale* var. *oryzae* [**30**, p. 429] parasitizes the panicles after flowering, and its spread is associated with high air humidity.

Helminthosporium oryzae [*Cochliobolus miyabeanus*: cf. **35**, p. 879; **36**, p. 513] develops on all the organs of the rice plant and at all stages of growth. It was found on 2-leaf seedlings in the mountains of French Guinea (Kissi dougou) and in irrigated fields in Senegal (at Richard Toll). *Lasiodiplodia* [*Botryodiplodia*] *theobromae* occurs on all the organs of the rice plant. *Piricularia oryzae* [**33**, p. 757] is uncommon in the Ivory Coast and in French Guinea, is not found in the Sudan or at Richard Toll, and appears late at Casamance. *Sporidesmium bakeri* [cf. **32**, p. 669; **35**, p. 165] attacks rice as well as sorghum, invading the glumes and leaf blades.

A remarkable feature of the rice disease situation in the area concerned is the almost complete absence of *P. oryzae* and *Corticium rolfsii*. The most serious diseases (locally) are seed-borne; dipping the seed into water at 53° C. for 10 min. or into a 0·2% copper acetate solution gave the best protection.

KAHN (R. P.) & LIBBY (J. L.). **The effect of environmental factors and plant age on the infection of Rice by the blast fungus, Piricularia oryzae.**—*Phytopathology*, **48**, 1, pp. 25–30, 2 fig., 6 graphs, 1958. [31 refs.]

In view of recent epiphytotics of rice blast in Florida and Louisiana [cf. **36**, p. 123] a quantitative bioassay of various factors involved was made at Fort Detrick, Frederick, Maryland. Previous literature on the subject is reviewed. Potted Caloro and Zenith plants were inoculated in a settling tower into which dry spores were discharged with a CO_2 pistol, the plants being held horizontally on a revolving turntable; thus a uniform spore deposition was ensured. After inoculation the plants were kept in dew cabinets and then in the greenhouses.

Infection occurred between 60 and 95° F. (opt. 80 or 85°) in the cabinets with 16–20 hr. dew exposure; at 80° the min. period of exposure required to initiate infection was 9–10 hr., infection increasing up to 23–24 hr. Below 80° over 10 hr. was required and less infection resulted, being half as much after 24 hr. at 65–70° as at 80°. The upper surface of the leaf was twice as susceptible as the lower. Susceptibility decreased as the plant aged, during winter that of the youngest leaf being greatest in plants 1–4 weeks old, leaves becoming resistant at 11–24 weeks (8–9 in summer). The youngest leaf was the most susceptible, and the oldest or apical portion the most resistant area in any one leaf. Susceptibility was greater on non-flooded than on flooded soils. Early planting would result in max. leaf susceptibility not coinciding with conditions favouring infection.

WEINTRAUB (R. L.), MILLER (W. E.), & SCHANTZ (E. J.). **Chemical stimulation of germination of spores of Piricularia oryzae.**—*Phytopathology*, **48**, 1, pp. 7–10, 2 graphs, 1958.

At Fort Detrick, Frederick, Maryland, a factor accelerating germination of *P. oryzae* (but not increasing the proportion of spores germinating) was found in rice polish, the unsaponifiable fraction of rice oil, and in groundnut and okra (*Hibiscus esculentus*) seed oils. A number of compounds, including sterols, steroidal sapogenins, steroidal amines, and α-tocopherol also proved to be stimulants, and similar results were obtained with uredospores of *Puccinia graminis*. An accelerator of germination was also present in the dew and the guttation liquid collected from rice leaves.

DE (P. K.) & MANDAL (L. N.). **Physiological diseases of Rice.**—*Soil Sci.*, **84**, 5, pp. 367–376, 1 diag., 1957.

In experiments at the State Agricultural Research Institute, West Bengal, India, rice plants were grown in waterlogged soils maintained in air or N, with and without the addition of $FeSO_4$ or H_2S solution. Growth was perfectly normal in all the treatments. Periodical analysis of the drainage water demonstrated (*a*) the disappearance of dissolved O after 21 days from soil kept under N; (*b*) the presence of large amounts of ferrous Fe in soil kept under N and treated with $FeSO_4$ solution; and (*c*) absence of H_2S or any soluble sulphide from soil kept under N and treated with H_2S solution. It was further shown that drainage water from soils maintained under air contained more dissolved O, ferric and ferrous Fe, Mn, and total oxidizable matter than that from soils kept under N.

These results do not support the theory that physiological disorders of rice, e.g. 'pansukh' in India [**37**, p. 232], browning in Hungary [**37**, pp. 161, 282], Fe toxicity induced in experiments at Cornell University, New York [**34**, p. 317], and 'penyakit merah' in Malaya [**35**, p. 711], are due to shortage of O_2, accumulation of ferrous Fe, or production of H_2S in the soil.

HSI (C. H.). **Environment and Sorghum kernel smut.**—*Phytopathology*, **48**, 1, pp. 22–25, 6 graphs, 1958.

Investigations at New Mexico Agricultural Experiment Station, Clovis, in 1953–55

on the effect of post emergence environmental factors on infection of sorghum by *Sphacelotheca sorghi* [**27**, p. 467; cf. **37**, p. 164] showed that plants irrigated 2 weeks after emergence were much more susceptible than those irrigated after 8 weeks. High temp. after planting resulted in less smut than moderate temp., regardless of soil moisture before or after emergence.

Cooper (W. C.), Olson (E. O.), Maxwell (N.), & Shull (A.). **Orchard performance of young trees of red Grapefruit on various rootstocks in Texas.**—*Proc. Amer. Soc. hort. Sci.*, **70**, pp. 213–222, 1957.

Between 1947 and 1950 in the Rio Grande Valley, Texas, red grapefruit trees were grown on rootstocks of 92 citrus species, hybrids, and varieties. Recently these rootstocks were classified into 3 groups: those sensitive to xyloporosis virus [cf. **36**, p. 317], those sensitive to exocortis virus [loc. cit.], and those insensitive to both. The 3rd comprised sour orange; the mandarin vars. Cleopatra, Ponkan, Lau Chang, P–117477, Kara, King, and Calashu (calamondin × satsuma); the tangelos Watt Sampson and San Jacinto; the hybrids ([*Poncirus*] *trifoliata* × orange) Savage, Sanders, Rustic, Rusk, and Uvalde (all citranges), and citrumelo C 4475, citrangeor C 43301, citremon C 46216, citraldin C 51130, and Thomasville citrangequat; Homosassa, Florida, Precoce, and Pineapple sweet oranges; Duncan, Webb Red Blush, and Webb Red Blush unbudded seedling grapefruits; Siam, Thong Dee, African, and India Red shaddocks; bigaraldin (sour orange × calamondin); Egyptian sour lime; *Severinia buxifolia*; Kalpi lime; and citrumelo C 4606. All except Pineapple orange were free from [unspecified] root rot and there was no tristeza virus in any orchard.

Fletcher (W. A.). **Citrus varieties and rootstocks for New Zealand.**—*Orchard N.Z.*, **30**, 11, p. 9, 1957.

The author further reports [**37**, p. 283] an additional rootstock known as yuzu (a hybrid of mandarin and *Citrus ichangensis*) which has become available to some extent in New Zealand in recent years. Though somewhat susceptible to *Phytophthora* root and collar rot [**35**, p. 25], it appears to be more drought resistant than sweet orange, which is the least tolerant of drought, but seems to be tolerant of or resistant to all the main viruses causing decline. Rough lemon (or citronelle) is as susceptible as sweet orange to root and collar rot and is not recommended for New Zealand grapefruit; for sweet orange and mandarin it should be avoided.

Shumakova (Mme A. A.) & Grube (A. M.). Роль **Epicoccum granulatum Penzig** в инфекционном усыхании Цитрусовых („маль-секко“). [The role of *Epicoccum granulatum* Penzig in the disease Citrus withering (mal-secco).]—Докл. Акад. сельскохоз. Наук Ленин [*Rep. Lenin Acad. agric. Sci.*], **22**, 3, pp. 33–39, 2 fig., 4 diag., 1957.

In the region of Batum, U.S.S.R., orange, lemon, mandarin, and other citrus trees attacked by mal secco (*Deuterophoma tracheiphila*) [**36**, p. 481] were also infected by *E. granulatum*. The similarity between the 2 species and their consistent association has sometimes led to a confusion between them. After experimental inoculation with *E. granulatum* alone on various parts of different citrus trees only 2 lemon leaves became infected. The 2 fungi are similar in attacking wounded parts of the bark and the leaves, causing pigmentation. They both grow in a medium containing sugar and change the pH to a constant level of 6·6–6·8. The toxic effect of *E. granulatum* was much greater than that of *D. tracheiphila* both on citrus and to various other fungi including *Helminthosporium sativum* [*Cochliobolus sativus*]. On citrus leaves separate colonies of the 2 pathogens were found, but in the bark *E. granulatum* was restricted to lesions already formed by *D. tracheiphila*.

All experiments indicated that *E. granulatum* cannot cause primary infection of citrus but accelerates the death of trees already attacked by *D. tracheiphila*.

ZACHOS (D. G.). **Septoria spots of Citrus in Greece.**—*F.A.O. Pl. Prot. Bull.*, **6**, 3, pp. 41–42, 1 fig., 1957.

Septoria citri was reported on citrus in Greece in 1939 (*Ann. Inst. phytopath. Benaki*, **3**, pp. 41–66, 1939). The fairly widespread occurrence of *S. depressa* on lemon fruits in the winter of 1955–6 [**37**, p. 165] occurred under weather conditions similar to those favouring this pathogen in New S. Wales [**29**, p. 407].

WELLMAN (F. L.). **'Hemileia vastatrix' — investigaciones presentes y pasados en la herrumbre del Café y su importancia en la América tropical.** [*Hemileia vastatrix*—present and past investigations on the rust of Coffee and its importance in tropical America.]—57 pp., 1 col. pl., 7 fig., Federación cafetalera de América (*Secc. Divulg.* 23), 1957. [105 refs. Mimeographed.]

This detailed study of *H. vastatrix* on coffee in Africa and Asia [map 5; **36**, p. 318] is intended to provide American growers with first-hand information should the disease reach America.

ECHANDI (E.) & SEGALL (R. H.). **The effectiveness of certain eradicant fungicides on inhibition of gemmae of Mycena citricolor.**—*Phytopathology*, **48**, 1, pp. 11–14, 2 fig., 1958.

Field trials in Costa Rica of the Hg fungicides found to control *M. citricola* on coffee leaves [**36**, p. 319] showed that 3 dry-season applications at monthly intervals were as effective as, or more so than 9 applications of Cu fungicides [**34**, p. 34] and were better than wet-season sprays, but a resultant toxic Hg residue in the beans makes the programme impracticable.

SACCAS (A. M.). **La maladie des taches zonées de Coffea excelsa en Oubangui-Chari due à Sclerotium coffeicolum Stahel.** [The zonate spot disease of *Coffea excelsa* in Ubangui-Chari due to *Sclerotium coffeicola* Stahel.]—*Rev. Mycol., Paris*, **22**, *Suppl. colon.* 2, pp. 65–84, 1 pl., 2 fig., 1957. [17 refs.]

After noting that in 1955 and 1956 *C. excelsa* seedlings in nurseries were attacked by *S. coffeicola* [cf. **1**, p. 14; **19**, p. 326], not previously recorded in French Equatorial Africa, the author gives a full account of the disease and the behaviour of the pathogen, based on his own observations and on the literature, including a detailed microscopic study of the fungus and a description of its cultural characters.

An agricultural development plan for Nevis.—*Bull. Developm. Welf. W. Ind.* 33, 59 pp., 1 map, 1957. 10*s.* 6*d.*

In para. 103 it is stated that the main diseases of cotton in Nevis (British West Indies) are bacterial disease (*Xanthomonas malvacearum*) [map 57], wilt (*Fusarium vasinfectum*), black boll (*Phytophthora* sp.) [cf. **37**, p. 168], and internal boll disease (*Nematospora* spp. etc.) [cf. maps 153, 163].

WICKENS (G. M.). **Present practice in the treatment of Cotton seed against bacterial blight (Xanthomonas malvacearum (E. F. Smith) Dowson).**—*Emp. Cott. Gr. Rev.*, **35**, 1, pp. 9–12, 1958.

This supplementary note [cf. **36**, p. 696] summarizes replies to a questionnaire. In Uganda [**37**, p. 236] perecot (the cuprous oxide preparation used) at 1:300 was found nearly equal to 1:150, if efficiently applied, but in experiments under conditions conducive to infection the very similar perenox gave much poorer control in the weaker formulation. Comparative trials in a number of areas all confirmed the superiority of Hg to Cu seed dressings in reducing primary infection, but because

of the possible danger involved in their application they are as yet used in only a few territories.

HIGGINS (A. E. H.). **The spraying and dusting of Cotton in East Africa.**—*Emp. Cott. Gr. Rev.*, **35**, 1, pp. 13–21, 2 pl., 1958.

A general discussion of the problems involved and comparison of the types of equipment used and their advantages or otherwise in practice.

RATAJ (K.). **Škodliví činitelé přadných rostlin.** [Harmful factors to fibre plants.]—*Pramen. Lit.*, **2**, 1–2, pp. 1–123, 1957.

A very comprehensive, cross referenced survey of 1,194 items of world literature on the subject, including fungus, virus, and non-parasitic diseases of flax, hemp, kenaf (*Hibiscus cannabinus*), and *Abutilon avicennae*, the last-named being grown experimentally in Czechoslovakia. The introduction and summaries of each section are given in Czech, Russian, English, and German. Abstracts of the majority of the references are presented in Czech, many in some detail. There is an index in the four languages of the main headings under which the material is arranged, an author index, and a list of the sources cited.

Catalogación de variedades de lino oleaginoso. [Catalogue of linseed Flax varieties.] —*Rev. Invest. agríc., B. Aires*, **11**, 3, pp. 287–298, 1957. [Received Feb. 1958.]

In this detailed description of 7 flax varieties, the Centro Regional Pampeano de Investigaciones Agrícolas records that Charrúa, Oliveros Toba M.A.G., and Pergamino Puelche M.A.G. are resistant to wilt (*Fusarium lini*) [**30**, p. 319] and to the predominant races (19, 20, 22, and 42) of rust (*Melampsora lini*) [**34**, p. 228]; that Pergamino Pampa M.A.G. is resistant to these diseases and also to pasmo (*Septoria linicola*) [*Mycosphaerella linorum*: **27**, p. 554] and lodging; Tezanos Pinto Entrerriano M.A.G. is resistant to wilt and very resistant to drought; Querandí M.A. is resistant to lodging; and P. 330 M.A. resistant to wilt.

TUREL (F. L. M.) & LEDINGHAM (G. A.). **Production of aerial mycelium and uredospores by Melampsora lini (Pers.) Lév. on Flax leaves in tissue culture.**—*Canad. J. Microbiol.*, **3**, 6, pp. 813–819, 2 pl., 1957.

At the Prairie Regional Laboratory, Saskatoon, Saskatchewan, when surface-sterilized cotyledons of Bison and Redwing flax plants experimentally infected with rust (*M. lini*) [cf. **36**, p. 186] were placed on a modified Knop medium containing fresh, ripe coconut milk, sucrose, and Difco bacto-agar, a dense, felt-like growth of aerial mycelium was obtained. This remained fully dependent on the living host tissue, but mycelium and spores could easily be collected free from host material in quantities sufficient for respiration and small-scale chemical studies. Increases and decreases in the production of mycelium were induced only by altering the metabolism of the host tissue. The hyphae displayed no tendency to grow saprophytically, and developed only where the leaf was not in contact with the nutrient medium. When the leaf tissue degenerated mycelial growth was arrested.

SERGEEV (L. A.). О биологическом методе борьбы с увяданием Хлопчатника. [On a biological method for the control of Flax wilt.]—*Zashch. Rast., Kiev, 1956*, pp. 56–62, 1956. [Abs. from *Referat. Zh. Biol., 1957*, 18, pp. 184–185, 1957.]

In a study of the microflora of the rhizosphere of flax in S. Ukraine 25 strains of 9 species were isolated. To determine their antibiotic activity against *Verticillium dahliae*, cultures on sterile oats were introduced into the soil in the field together with flax seeds (var. 611–b). Previously the soil had been inoculated with cultures of *V. dahliae*. The antibiotic fungi reduced infection from 44·4–32·2%. Some

strains not only decreased the disease but increased yield. The best results, however, were obtained with pure peat with cultures of *Azotobacter chroococeum*; also when the antigonists were introduced at a depth of 8–10 cm.

NOVELLO (C.). **Segnalazione di Verticillium sp. su Cannabis sativa.** [Report of *Verticillium* sp. on *Cannabis sativa*.]—*Ric. fitop. Campan.*, **13–14**, pp. 161–163, 1 fig., 1957. [English summary.]

A report of an unidentified *V.* sp. causing wilt of hemp growing near Naples appears to be a first record for Italy, nor is natural infection known from elsewhere [cf. **13**, p. 369].

SAUTHOFF (W.) & GERLACH (W.). **Über eine bisher nicht bekannte Fusarium-Welkekrankheit an Aechmea fasciata (Lindl.) Bak.** [On a hitherto unknown *Fusarium* wilt disease of *Aechmea fasciata* (Lindl.) Bak.]—*NachrBl. dtsch. PflSchDienst (Braunschweig), Stuttgart*, **10**, 1, pp. 1–3, 5 fig., 1958.

At the Laboratorium für Zierpflanzenbau und Institut für Mykologie, Berlin-Dahlem, an investigation was made of a wilt disease of the ornamental *A. fasciata*, serious in W. German nurseries, caused by *F. bulbigenum* f. *aechmeae* f.nov. A wilt of the seedling leaves is followed by the appearance on a leaf base of a grey-green or brownish lesion, which under warm, humid conditions rapidly spreads upwards over the leaf surface, remaining clearly demarcated. The leaf collapses when the free part of the blade is reached, and later rolls up and dries. This condition spreads successively from the outer to the inner leaves. Under cool, dry conditions the original leaf base lesion does not spread upwards, but the fungus slowly penetrates the bases of the inner leaves, often accompanied by secondary invaders. When they have all been destroyed the plant suddenly dies. The internal symptoms are little affected by the environment; brown discoloration of the vessels in the stem close behind the growing point is a reliable diagnostic feature. *Fusarium* isolates produced leaf base lesions within 6 weeks on 1-year plants, the majority being destroyed by wilt in about 3 months. It is thought that the pathogen normally enters by the roots, and hygienic measures are recommended.

Inoculation tests on a large number of other bromeliaceous plants failed to induce infection.

PŘÍHODA (A..) **Hniloby Kaktusu.** [Cactus rot.]—*Živa*, **4**, 4, pp. 141–143, 1956. [Abs. from *Referat. Zh. Biol.*, *1957*, 18, p. 186, 1957.]

The symptoms and development of fungal diseases of cacti caused by *Helminthosporium cactivorum* [cf. **35**, p. 528] (imported from Mexico), *Botrytis cinerea*, *Fusarium oxysporum*, *F. aqueductum* var. *dimerum*, *Phytophthora cactorum*, *Pythium debaryanum*, *P. aphanidermatum* (on roots and seedlings), and *Moniliopsis aderholdii* in Czechoslovakia, and their control are described.

WOOLLIAMS (G. E.). **Geranium stem-end rot.**—Abs. in *Proc. Canad. phytopath. Soc.*, **25**, p. 19, 1957.

At the Plant Pathology Laboratory, Summerland, British Columbia, control of a dark brown, basal stem rot of *Pelargonium* cuttings, caused by *Botrytis cinerea*, and of black, basal stem rot, due to *Pythium ultimum*, was obtained by (*a*) preparing cuttings early in Sept., (*b*) dipping freshly prepared cuttings early into 2% ferbam or thiram dust. Combination of 1% agrimycin with the dusts increased disease control and root formation.

VERNEAU (R.). **Il seccume fogliare dell' Iris.** [Dry leaf spot of Iris.]—*Ric. fitop. Campan.*, **13–14**, pp. 23–34, 5 fig., 1957. [English summary.]

An account is given of leaf spot of iris caused by *Didymellina* [*Mycosphaerella*]

macrospora [cf. **32**, pp. 63, 102]. The disease has frequently been reported from different parts of Italy, including Naples [**1**, p. 303], where it occurs even early in Jan. It affects especially the so-called Holland iris. In the mild climate of Naples the fungus never ceases to be active, perennating by means of the conidia, not the ascospores. The attacks become less intense in summer. Spraying trials showed that in the vicinity of Naples moderately effective control is given by spraying at frequent intervals with thiram or 1% Bordeaux mixture plus an adhesive and a wetter after removal of the affected leaves. Rotation should also be practised.

TROLL (H-J.) **Zur Frage der Bräunevirusübertragung durch das Saatgut bei Lupinus luteus.** [On the question of seed-transmission of the browning virus of *Lupinus luteus*.]—*NachrBl. dtsch. PflSchDienst, Berl.*, N.F., **11**, 11, pp. 218–222, 1957. [English and Russian summaries.]

From the Institut für Acker- und Pflanzenbau, Müncheberg/Mark, are reported trials carried out in 1952, 1955, and 1956, in which seed from a number of lupin varieties and strains, both healthy and infected by browning [cucumber mosaic] virus [**16**, p. 680; **32**, p. 319], was sown in 2 widely separated localities. The results indicated that the virus was seedborne.

NÉMETH (G.). **A Lupinus luteus keskenylevelűséggel összefüggő meddősége.** [Sterility accompanying narrow-leaf in *Lupinus luteus*.]—*Növenytermelés*, **5**, 3, pp. 271–291, 6 fig., 11 graphs, 1 diag., 1956. [Russian and English summaries. Received 1958.]

In recent years growers of lupin seed in Hungary have experienced heavy losses from narrow leaf and sterility. All attempts to transmit the condition at the Agricultural Research Institute of the Nyírség, Gyulatanyá, failed. The results of a series of experiments (dense versus thin stands, serial sowings, growing under insect-proof covers, etc.) indicated that there is a close connexion with microclimatic conditions. In thin stands or with late sowing there is profuse growth of rosettes and lateral shoots, leading to limitation of the growth of the main axis and hence to the development of the disease. It is concluded that the disease is of physiological origin, though the possibility of secondary virus infection in the narrow-leaved plants cannot be excluded.

USCHDRAWEIT (H. A.) & VALENTIN (H.). **Untersuchungen über ein Kruziferen-Virus.** [Studies on a Crucifer virus.]—*Phytopath. Z.*, **31**, 2, pp. 139–148, 7 fig., 1957.

At the Institut für gärtnerische Virusforschung, Berlin-Dahlem, the virus responsible for flower breaking of stocks (*Matthiola incana*) [**31**, p. 363], which had been observed in the Berlin region and in other parts of Germany, was used to inoculate 30 varieties of 10 families and 22 genera. The results show that it is very similar to turnip mosaic virus [loc. cit.] of which it is a variant or strain. It has threadlike particles of an average length of 756 mμ; is inactivated at 57° C. in 10 min., the dilution point is 1:10,000, and longevity *in vitro* at room temperature approximately 12–14 days.

In the field 30 naturally infected host species were detected. Natural infection of 3–5% was diagnosed in herbaceous ornamentals from 1 to several years old. In many varieties the virus causes heavy losses during overwintering, particularly when a mixed infection with other viruses occurs.

MILLER (V. L.), GOULD (C. J.), & POLLEY (DOROTHY). **Some chemical properties of phenylmercury acetate in relation to fungicidal performance.**—*Phytopathology*, **47**, 12, pp. 722–726, 1957.

A study made at the State College of Washington, Puyallup, on the effects of

various factors on phenylmercuryacetate (PMA) when used for the control of basal rot of narcissus bulbs (*Fusarium oxysporum* f. *narcissi*) [*F. bulbigenum*: **32**, p. 314] showed the substance to be varyingly soluble in a large number of solvents, and least so in water. PMA was removed from dilute aqueous solution by soils, particularly organic types, but formulation with thiols or cyanide overcomes this.

Dilute PMA solutions were weakened (the extent depending on the formulation) in contact with aluminium, iron, or wood, but not stainless steel, brass, copper, or concrete. Addition of a little NaOH improved stability to iron. A solution containing an equivalent amount of thiomalic acid, buffered to pH 10·5, which promoted the formation of diphenyl mercury, was stable in contact with wood; this mixture gave satisfactory control of basal rot if used at such a concentration that the PMA residue on the bulbs was equivalent to that supplied by the unformulated solution.

Verneau (R.). **Sulla presenza della Thielaviopsis paradoxa in Campania.** [On the presence of *Thielaviopsis paradoxa* in Campania.]—*Ric. fitop. Campan.*, **13–14**, pp. 35–43, 1 pl., 2 fig., 1957. [English summary.]

An account is given of the symptoms and causal agent of a wilt of young *Phoenix canariensis* trees which occurred in 2 gardens at Naples in 1952 as a result of infection by *T.* [*Ceratocystis*] *paradoxa* [cf. **26**, p. 329]. To a few older trees the disease proved fatal. It affected the leaves, stems, and shoots. Control depends on removing the infected parts from young trees and frequent spraying with 1% Bordeaux mixture; trees on which the shoots are infected should be dug up and destroyed. Any centre of infection might be very dangerous near Naples, where there are many palms and the climate strongly favours the fungus.

Thompson (H. S.). **Studies of Pythium rot of Saintpaulia, the African Violet.**—Abs. in *Proc. Canad. phytopath. Soc.*, **25**, p. 18, 1957.

At the Botany and Plant Pathology Laboratory, Ottawa, *P. ultimum* was isolated from *S.* [*ionantha*] with root and crown rot. It was able to cause a decay of leaf cuttings and rooted cuttings. Infection and decay occurred over a wide range of soil moisture and were not limited by any soil temperature from 10–30° C. Plants in contaminated soil remained healthy, but became predisposed to attack by prolonged exposure to intense light or by infestation with [unspecified] nematodes. Young plants large enough to be planted singly in soil, but maintained over a lengthy period in vermiculite, became infected and decayed completely when planted in contaminated soil.

Current research and investigation.—*Orchard. N.Z.*, **30**, 9, p. 13, 1957.

The Plant Diseases Division and Fruit Research Station [cf. below] reports that B deficiency occurred on Sturmer apples in the Blenheim, Christchurch, and Mt. Albert districts, where it has not previously been seen. Over 2 consecutive seasons Hastings-grown Ballarat, Jonathan, and Sturmer apples have not stored well under the Australian treatment [cf. **33**, p. 91; **37**, p. 241] of starting at 38° F. and then reducing to 32° followed by a drop of 2° every month, successful there with both Jonathan and Granny Smith. All three N.Z. varieties stored best at 37–38°.

Peach calico virus [cf. **36**, p. 534] has been found throughout New Zealand but on only a few trees (peaches and nectarines) in each district. Attempts at transmission to other stone fruits have failed.

Current research and investigation.—*Orchard. N.Z.*, **30**, 11, pp. 13, 15, 1957.

In a further report in this series [cf. above] it is stated that as agrimycin will control plum bacterial spot [*Xanthomonas pruni*: **32**, p. 322] in the glasshouse there must be some unidentified factor preventing control in the field and sprays are being wrongly timed.

In a Hastings trial on Jonathan apples, sulfane at green tip and at the 4 subsequent stages reduced shoot infection by powdery mildew [*Podosphaera leucotricha*: **33**, p. 140] by 44%, while at Roxburgh lime-sulphur at green tip, sulfane from pink to 1st cover, and karathane to mid-Feb. confirmed the superiority of the standard S programme. The importance of winter pruning was also demonstrated in this trial. Sulfane and karathane improved the foliage in all district trials. At Alexandra karathane proved more effective than S on Cox's Orange Pippin.

At Roxburgh Fe chelate, applied as a soil dressing at $\frac{1}{2}$ lb./tree for the 3rd successive year, eliminated Fe deficiency symptoms in apple.

Brown rot of stone fruit [*Sclerotinia fructicola*: **33**, p. 140] remained severe in the north and appears to be increasing in the south. Trials with dichlone blossom sprays and captan or thiram pre-harvest gave good control on apricots. The effect of the most efficient blossom programme was noticeable right through to the final inspection 4 days after harvest.

Brooks (R. M.) & Olmo (H. P.). **Register of new fruit and nut varieties. List 12.**—*Proc. Amer. Soc. hort. Sci.*, **70**, pp. 557–584, 1957.

This further list [cf. **36**, p. 472] includes the Carolina blackberry (from Austin Thornless × Lucretia), more resistant to *Septoria* leaf spot [*Mycosphaerella rubi*: **35**, p. 379] than Lucretia; the Everglades grape (Fennell 18 × Fennell 105), moderately resistant to rust [*Angiopsora ampelopsidis*: cf. **35**, p. 330], anthracnose [*Elsinoe ampelina*], and black rot [*Guignardia bidwelli*]; the Kakea and Keauhou vars. of *Macadamia ternifolia*, both open-pollinated seedlings, the former with good, and the latter very strong resistance to anthracnose; the Edward (Simmonds ×) mango, relatively resistant to anthracnose [*Glomerella cingulata*: **35**, p. 780], one of the best varieties for home gardens; Red Gold peach (Hal-Berta Giant × Sunrise), highly resistant to *Xanthomonas pruni* and brown rot [*Sclerotinia fructicola*]; Eller, Orcross, Oregon 18, and Vistica Nectar pears, the 1st with some resistance to fireblight [*Erwinia amylovora*], the 2nd a resistant rootstock, the 3rd resistant, and the 4th highly so; the Mandarin raspberry (from (*Rubus parvifolia* × Taylor) × Newburgh), more resistant to *Septoria* leaf spot [*M. rubri*] than most American varieties; and the strawberries Redglow (US–4194 from Fairland × Tennessee Shipper), resistant to red stele (*Phytophthora fragariae*), and Surecrop (Maryland–US–2233 from Fairland × Maryland–US–1972), resistant to more than one race of the fungus.

Groves (A. B.). **Root diseases of deciduous fruit trees.**—*Bot. Rev.*, **24**, 1, pp. 25–42, 1958. [70 refs.]

This article is a decennial supplement to Dr. Cooley's review [**25**, p. 204] and is devoted more particularly to the fields of remedial and preventive measures, manner of infection and spread, the role of environmental factors in disease development, and other related problems. Attention is centred primarily on root disease problems of pome and stone fruits as they occur in the United States and Canada.

Welsh (M. F.) & Keane (F. W. L.). **Leaf pucker—a virus disease of Apple.**—Abs. in *Proc. Canad. phytopath. Soc.*, **25**, p. 18, 1957.

In graft transmission tests at the Plant Pathology Laboratory, Summerland, British Columbia, a disorder causing puckering and yellow flecking of McIntosh apple leaves and fruit distortion was transmitted to McIntosh and Spartan, in which foliage symptoms were induced, but not to Winesap or Jonathan.

Walker (D. R.) & Fisher (E. G.). **The use of chelated magnesium and magnesium sulfate in correcting magnesium deficiency in Apple orchards.**—*Proc. Amer. Soc. hort. Sci.*, **70**, pp. 15–20, 1957.

At Cornell University, Ithaca, New York, chelated Mg sprays or soil applications

were less effective in increasing Mg in apple leaves than were sprays of $MgSO_4$ [cf. **35**, p. 419], which when given in early or mid-July increased significantly the leaf content of Mg in Sept., in comparison with trees similarly treated in June, shortly after bloom.

Moon (H. H.), Wilson (R. A.), & Magness (J. R.). **Evaluation of some Pear varieties and selections for transmitting blight resistance, fruit quality, and fruit size.**—*Proc. Amer. Soc. hort. Sci.*, **70**, pp. 70–73, 1957.

At the Horticultural Crops Research Branch, Beltsville, Maryland, the pear varieties Waite (among the most resistant to *Erwinia amylovora*) [**37**, p. 47], Ree Carlodi Wurtemburg (which has shown only traces of fireblight at Beltsville), Michigan 437 (moderately resistant), Fame (said to be resistant, but degree of resistance uncertain), and Ewart (said to be somewhat resistant) transmitted blight resistance to their progeny in approximately the order named. Box (susceptible), Comice (susceptible), Michigan 504 (more susceptible than Michigan 437), Michigan 550 (susceptible), Vermount Beauty (degree of resistance uncertain), Winter Bartlett (reputedly resistant but degree of resistance uncertain), and Winter Nelis (less affected than most European varieties) transmitted little, if any, resistance. There was a relatively high level of resistance in the progeny when both parents conferred resistance, an intermediate level when only one transmitted, and a very low level when neither did so.

Verneau (R.). **Il mosaico dell' Albicocco e del Susino in Campania.** [Mosaic of Apricot and Plum in Campania.]—*Ric. fitop. Campan.*, **13–14**, pp. 87–99, 1 pl., 1 fig., 1957. [English summary.]

An account is given of a widespread mosaic disease, here attributed to plum pox virus [**14**, p. 367], also observed on peaches and almonds [**30**, p. 375; **35**, pp. 774, 896; **36**, p. 476] in Italy.

Morvan (G.). **Transmission par greffage des symptomes de dépérissement de l'Abricotier.** [Graft-transmission of wilt symptoms in Apricot.]—*Fruits d'outre-mer*, **12**, 8, pp. 335–339, 3 fig., 1957.

This work has already been noticed [**37**, p. 292].

Davidson (T. R.) & George (J. A.). **Symptoms of Sour Cherry yellows and necrotic ring spot in relation to time of infection.**—Abs. in *Proc. Canad. phytopath. Soc.*, **25**, p. 13, 1957.

At the Plant Pathology Laboratory, St. Catharines, Ontario, when virus-free Montmorency cherry trees were inoculated monthly with an isolate of sour cherry yellows virus [cf. **36**, p. 599; **37**, p. 293] or necrotic ring spot virus [peach ringspot virus: loc. cit.], the former caused shock symptoms in all treatments, whereas the latter induced shock or etch symptoms. The sole variation in the shock symptoms was in their situation in relation to the inoculation site. Hence, unless the point of infection is known, the siting and progress of shock are valueless for determining when infection took place.

Ciferri (R.), Rui (D.), Scaramuzzi (G.), & Bonfante (S.). **Virus dieback of Sweet Cherry in Verona, Italy.**—*F.A.O. Pl. Prot. Bull.*, **6**, 3, pp. 37–38, 1 fig., 1957.

From the Laboratorio Crittogamico Italiano, Pavia, and the Osservatorio Fitopatologico, Verona, a virus dieback of sweet cherry is described which has long been known in Verona, especially the Valpolicella district, and has now spread to cause 40% decrease in production. The var. Mora di Cazzano is particularly susceptible.

Initially only part of a tree is affected, but spread results in its death in 3–6 years.

In the 1st year oily spots on the leaves are accompanied by phloem necrosis; in subsequent years the leaves yellow and curl, with marginal reddening, and they become generally deformed and rosetted. Fruit production is reduced and die-back begins. The leaf symptoms alone have been noted also on Mazzard cherry root stocks, but Mahleb stocks are unaffected.

Originally suspected to be nutritional deficiency [cf. **34**, p. 793], the disease was subsequently shown to be of virus origin by graft transmissions initiated in 1956. Symptomatology suggests it may belong to the cherry Pfeffinger [cherry rasp leaf] virus group [cf. **35**, p. 375], but until its identity is certain it is to be referred to as [cherry] virus dieback [cf. **36**, p. 770].

WEBER (G.). **Eine Fruchtnekrose der Süßkirsche.** [A fruit necrosis of Sweet Cherry.]—*NachrBl. dtsch. PflSchDienst* (*Braunschweig*), *Stuttgart*, **9**, 12, pp. 179–181, 4 fig., 1957.

From the Pflanzenschutzamt der Land- und Forstwirtschaftskammer, Hessen-Nassau, Frankfurt on Main, an apparently new virus disease, affecting Scheider's Späte Knorpel cherry, was first noticed at Ockstadt, Oberhessen, on two adjacent trees grafted to wild cherry. The first symptoms were punctate, dark discolorations of the fruit, increasing either to patches with large epidermal pores or to small depressions; as the fruits matured the former dried out to form firm folds in the skin and the latter extended, while there was a general shrinking of the mesocarp. About 25% of the fruits were affected to a greater or lesser extent, and in its early phases the condition resembled shot-hole (*Clasterosporium* [*carpophilum*]). There were, however, no leaf symptoms. On the mother tree from which the scions had been taken there were somewhat different fruit symptoms. Discoloured patches appeared at the onset of reddening, and desiccation of the underlying mesocarp led to their standing out from the surrounding tissue with a clear line of demarcation. On fully ripe fruits light red lines could sometimes be seen irregularly enclosing the affected patches. Splits developed round the latter, broadening to form necrotic crusts. Finally the mesocarp came to form a leathery skin overlying the stone.

Further search in the immediate area (135 ha.) led to the discovery of 10 affected trees, all of the same variety grafted to wild stock. In an attempt to remedy the situation the grower cut back drastically the Schneider's Späte Knorpel scions and grafted on healthy Hedelfinger Riesen. Two years later 82% of fruits of this var. developed discoloration and necrosis, while those of the wild cherry stock were shrivelled and different in taste.

The infection does not spread from tree to tree, but the stock is rapidly infected from the scion.

Notes and comments.—*Gdnrs' Chron.*, [Ser. 3], **143**, 4, p. 50, 1958.

Silver leaf [*Stereum purpureum*] is now causing concern in British cherry orchards. As cherries are not at present included in the Silver Leaf Order, the Ministry of Agriculture is considering setting up a plant health force to check the disease and including cherries in the Order.

STUBBS (L. L.). **A comparison of three low-persistence viruses of the Strawberry.**—*Aust. J. agric. Res.*, **8**, 6, pp. 652–658, 2 pl., 1957.

At the Plant Research Laboratory, Burnley, Victoria, no evidence of cross-protection or interference was found among 3 viruses of low persistence in *Pentatrichopus fragaefolii* producing symptoms of mild intensity (yellow mottle), intermediate (more intense mottle with some rugosity), or severe (epinasty, chlorosis, and distortion of the leaves, later severe dwarfing) on strawberry seedlings. The viruses of both the intermediate and the severe types multiplied in *Fragaria vesca* indicator

plants previously infected by the mild type; symptoms of either were not delayed but were intensified compared with single-virus infections. The mild and severe viruses were separated from mixed infections by serial transfer of aphids bred on the infected plants, but separation appeared to be by chance rather than by elimination of the least persistent virus during the transfers.

Under the present system of nomenclature the author's viruses would be included in the mottle or virus 1 group [strawberry mottle virus: cf. **35**, p. 875; **37**, p. 174]. The mild isolate came from the vars. Melba and Ettersburg 80 growing in north-western Victoria, where summer temperatures are consistently high, the intermediate from approved stocks of Phenomenal from Queensland, while the severe form occurs frequently in association with crinkle virus in southern Victoria. Work by the author in California has convinced him that some of the group 1 viruses in N. America are more virulent than any he has isolated in Australia.

SUBRA (P.). **Caractères de la culture Bananière en Jamaïque.** [Features of Banana culture in Jamaica.]—*Fruits d'outre mer*, **12**, 9, pp. 391–399, 6 fig., 1 map, 1957.

In the section dealing with control measures for diseases and parasites (pp. 395–396) the author reports that the oil spraying tests started in Jamaica in Oct. 1955 against Sigatoka [*Mycosphaerella musicola*: **37**, p. 48 and below] were quite effective. On the large estates in the southern plains spraying was done from helicopters, whereas in the higher regions portable machines were used. In the former, with very gentle winds, 75 ha./hr. were treated from the air with 15 l./ha. The fairly low rainfall (less than 2 m.) in these areas and treatment throughout the year (17 applications, as with Bordeaux mixture) have made it possible hitherto to use oil alone without the addition of fungicides. It would appear that 6–9 applications/year with a total of 1–1·5 kg. Cu/ha. would be sufficient in most of these regions.

DESROSIERS (R.) & AMPUERO (E.). **Primeros resultados obtenidos en los trabajos de investigación en el control de la sigatoka durante el período de julio de 1956 hasta junio de 1957.** [First results obtained from the investigation of the control of Sigatoka during the period from July 1956 to June 1957.]—*Bol. Divulg. Asoc. nac. Banan. Ecuador* 1, 8 pp., 1957. [Mimeographed.]

The authors report from Guayaquil, Ecuador, that the control of banana Sigatoka [*Mycosphaerella musicola*: **34**, p. 381; cf. above] obtained by low-volume spraying was equal to or better than that obtained by earlier methods. At 28 l./ha. 'agricultural oil' in water with various fungicides gave good control of the disease, and results improved as the oil was increased from 20 to 60%. 'Agricultural oil' alone at 28 l./ha. was almost equally good. It would appear that any of the usual fungicides could be used in these mixtures. The results of tests, together with the amounts of zineb or copper oxychloride used, are tabulated. Portable, semi-portable, and larger, tractor-drawn sprayers were used, also helicopters, according to the nature of the ground.

DESROSIERS (R.) & AMPUERO (E.). **Las enfermedades más importantes del campo que afectan al Banano en el Ecuador.** [The most important diseases affecting Bananas in the field in Ecuador.]—*A.N.B.E.* (*Asoc. nac. Banan. Ecuador*), **2**, 1, pp. 33–36, 2 fig., 1957.

The authors describe the symptoms and control of Sigatoka (*Mycosphaerella musicola*) [see above], Panama disease (*Fusarium oxysporum* [f.] *cubense*) [**17**, p. 100], and bacterial wilt (*Xanthomonas* [*Pseudomonas*] *solanacearum*) [map 138] in Ecuador.

TEAKLE (D. S.). **Avocado root rot.**—*Qd. agric. J.*, **83**, 12, pp. 701–704, 2 fig., 1 diag., 1957.

Root rot (*Phytophthora cinnamomi*) [**36**, p. 307] has caused the unthriftiness or

death of hundreds of avocado trees in S.E. Queensland since 1949. Glasshouse experiments with young avocado plants proved that the fungus is responsible for root rot, as it killed or stunted them when mixed with the soil.

Avocados should be planted only in deep, well-drained soils; waterlogging must be minimized by surface drainage; trees should be raised and grown on the planting site to avoid introduction of the fungus in nursery stock; and they should not be planted where trees have died from root rot.

LEBEAU (J. B.). **Snow mold of forage crops in Alaska and Yukon.**—Abs. in *Proc. Canad. phytopath. Soc.* **25**, p. 15, 1957.

At the Science Service Laboratories at Edmonton and Lethbridge, Alberta, *Sclerotinia borealis* [cf. **37**, p. 50], *Plenodomus meliloti* [cf. **35**, p. 102], and the low-temperature basidiomycete [**37**, p. 50] were isolated from forage crops collected in Alaska and Yukon affected by overwintering damage. In addition to these low-temperature pathogens, which cause a high percentage of the winter-killing of herbaceous plants there, many other organisms were isolated, including several *Fusarium* spp. This is the first occasion on which the low-temperature basidiomycete has been found beyond the Canadian border.

SLYKHUIS (J. T.). **Virus diseases of grasses in Europe.**—Abs. in *Proc. Canad. phytopath. Soc.*, **25**, pp. 17–18, 1957.

A survey of grass viruses in N.W. Europe made in Apr.–May 1957, showed that cocksfoot mosaic [? streak] virus [on *Dactylis glomerata*: cf. **35**, p. 371; **36**, p. 191] and rye grass [? streak] mosaic virus [on *Lolium* spp.: **36**, p. 812] were present in France, Holland, Germany, Denmark, Sweden, and Finland, but not in Norway. Symptoms of cereal [barley] yellow dwarf virus [loc. cit.] were seen on winter cereals or perennial grasses or both in all these countries except Denmark. Barley false stripe virus [barley stripe mosaic virus: loc. cit.] was identified in barley varieties in a world collection at Gatersleben, Germany. The English type of cereal [wheat] striate mosaic [loc. cit.] was found in Germany and Denmark.

JAMALAINEN (E. A.). **Overwintering of Gramineae—plants and parasitic fungi. II. On the Typhula sp. fungi in Finland.**—*Maataloust. Aikakausk.*, **29**, pp. 75–81, 1957. [Finnish summary.]

In this further study from the Agricultural Research Centre, Tikkurila [cf. **30**, p. 44] the collections of *T. itoana* [cf. **36**, p. 702] and *T. idahoensis* [cf. **30**, p. 124] (previously referred by the author to *T. borealis* [**33**, p. 743]) in the herbarium of the Plant Pathology Dept are listed and the fungi described. It is concluded that both are common in Finland on winter cereals and forage grasses.

WRIGHT (C. E.). **Blind seed disease of Ryegrass. I. Summary of preliminary investigations into the techniques of evaluating degrees of resistance to Phialea temulenta in Lolium perenne. II. A semi-natural field technique designed to test blind seed disease reaction of spaced Ryegrass plants. III. The blind seed reaction of certain Ryegrass strains tested as space plants under semi-natural epiphytotic conditions.**—*Res. & exp. Rec. Minist. Agric. Nth. Ireland*, **6** (*1956*), pp. 1–3; 4–13, 2 graphs; 14–18, 1 graph, 1957.

In the 1st paper it is noted that in 1946 the Northern Ireland harvest of certified crops of perennial ryegrass produced nearly 50% of non-viable seed, mainly as the result of an attack by the blind seed fungus (*P.* [*Gloeotinia*] *temulenta*) [**23**, p. 228]. Irish Commercial seed did not, however, show a similar drop in germination, the local strain apparently having greater resistance.

Trials to determine the optimum conditions to obtain full infection [cf. **25**, pp. 168, 263] showed that complete immersion of heads in conidial suspension was superior to atomisation, that more than one inoculation increased infection, and

that the stage of flowering was the most important single factor involved; all the seed from florets open at the time was diseased. The necessity for a cool, moist atmosphere was demonstrated, but the combination and range of temp. and humidity required have not yet been fully ascertained.

The 2nd paper states that a composite sample of 3 varieties, containing 10% diseased seed, was collected each year from widely separate areas and used between spaced plants to induce field infection, following Calvert and Muskett's methods [**23**, p. 229]. From the 866 plants in 1 trial infection ranged from 0–63 (av. 22·9)%; only 2 plants were without infection. From a further experiment in boxes placed outside it was concluded that sowing at the end of Jan. probably coincided with the time most favourable for apothecial production, but though this could also take place up to the end of Feb. late sowing would have little deleterious effect. From a watering experiment it was concluded that it would be impracticable to attempt to impose a humidity system on plants in the open without greatly upsetting normal pollination and seed setting. The method of winter sowing of diseased seed between established plants would be practicable for the mass screening of a large amount of material prior to more rigorous testing of smaller numbers.

Under the conditions of the experiments reported in the 3rd paper early rye-grass strains were relatively much more heavily infected than late; the opposite was found to be true by Gemmell (*Bull. W. Scot. agric. Coll.* 136, 1940) for commercial seed crops in Ayrshire. It is probable that in any year the heaviest infection will be on the group of strains (early, intermediate, or late) in which flowering coincides with a period of max. ascospore dispersal. The difference between the mean ear emergence in any strain in an early and a late season seldom exceeds 7–10 days. On the other hand, observations on similar sowings of diseased seed at Loughall during the past 3 years have revealed striking annual and inter-site variations in the onset and duration of apothecial production. Thus, the value of breeding for escape from the disease by attempting to produce a strain with a flowering period which might avoid peak ascospore production is doubtful.

Sowmini Rajagopalan (C. K.) & Rangaswami (G.). **Bacterial leaf-spot of Pennisetum typhoides.**—*Curr. Sci.*, **27**, 1, pp. 30–31, 1958.

At the Agricultural Research Institute, Coimbatore, India, a leaf spot disease of *P. typhoides* plants of all ages is prevalent. Initial water-soaked spots on the upper surface of the leaf turn reddish-brown in 2–3 days and then enlarge to become rectangular, $2\text{–}5 \times 1\text{–}3$ mm., bounded by veins, depressed, and chocolate brown. There is no halo. The causal bacterium, which is described and named *Xanthomonas penniseti* Sowmini Rajagopalan & Rangaswami, is mainly confined to the vascular bundles. Artificial inoculation failed to infect a number of other gramineous and some solanaceous hosts.

Hawn (E. J.). **Histological studies on crown bud rot of Alfalfa.**—Abs. in *Proc. Canad. phytopath. Soc.*, **25**, p. 14, 1957.

Further information from the Science Service Laboratory, Lethbridge, Alberta, on the causation of crown bud rot of lucerne [**37**, p. 101], obtained by the examination of artificially inoculated crown buds, indicates that mycelium of *Rhizoctonia* [*Corticium*] *solani* was present inter- and intracellularly and that *Fusarium avenaceum* and *F. acuminatum* induce disorganization and death of the host cells in advance of the mycelium. The mode of action of *Aschochyta imperfecta* is not clear.

McDonald (W. C.). **The Pseudoplea-Pleospora complex on Alfalfa.**—Abs. in *Proc. Canad. phytopath. Soc.*, **25**, pp. 15–16, 1957.

Cultural and pathogenic studies at the Plant Pathology Laboratory, Winnipeg, demonstrated that the lucerne pathogens *Pleospora herbarum* (stat. conid.

Stemphylium botryosum) and *Pseudoplea trifolii* are separate species [cf. **33**, p. 357; **35**, p. 21]. Cultures of *P. trifolii* from lucerne in Manitoba resembled isolates from Minnesota, Wisconsin, and Pennsylvania; they produced no *S. botryosum* conidia. Isolates of the latter from Manitoba produced mature ascospores of *Pleospora herbarum* [cf. **36**, p. 248] on natural and synthetic media.

Mature ascospores of *Pseudoplea trifolii* were produced in 5–10 days on V-8 juice agar at 60° F. in light. Typical leaf spots developed 48 hr. after sporulating cultures were inverted over healthy, detached lucerne leaves floating in distilled water, or over mature plants in a humidity chamber. With *Pleospora herbarum* at least 4 days were required before symptoms appeared on the leaves. Ascospores of *Pseudoplea trifolii* penetrate directly through the epidermis, while conidia and ascospores of *Pleospora herbarum* generally pass through the stomata. Detached leaves inoculated with both bear the two kinds of perithecia in the dead areas, together with *S. botryosum* conidia.

SCHUSTER (G.). **Untersuchungen über die Auswirkungen von Virusbefall auf den Alkaloidgehalt von Datura stramonium L. var. stramonium.** [Studies on the effects of virus infection on the alkaloid content of *Datura stramonium* L. var. *stramonium*.]—*Phytopath. Z.*, **31**, 2, pp. 123–132, 1 fig., 1957. [English summary.]

At the Institut für Phytopathologie, Karl Marx University, Leipzig, young plants of *D. stramonium* var. *stramonium* were carborundum inoculated with strain H 19 of potato virus X. At first there was an increase in alkaloid content (as determined by paper chromatography and dry weight) compared with uninoculated plants, but later it fell to that of the controls, and then sank considerably below it. Early infections also lower the quality of the crop.

PLENET (R.). **Note sur la maladie noire du Vanillier à la Réunion.** [A note on the black disease of Vanilla in Réunion.]—*Rev. agric. Réunion*, N.S., **57**, pp. 148–155, 1 fig., 1957.

'Black disease' of vanilla [cf. **33**, p. 183] appears to be spreading in Réunion, where it is causing the cultivation of this crop to decline. The name is generally used to denote a black rot, yellow at first, mainly affecting the stems, but which also occurs on the leaves and pods. The disease usually starts at the base of the plant and rapidly kills off a whole clump of plants, destroying entire plantings in a few weeks.

Affected material from the regions of Saint-André and Bras-Panon invariably bore *Glomerella vanillae* [**13**, p. 58], often with *Calospora* [*Botryosphaeria*] *vanillae* [**13**, p. 57], while in the excessively damp area of Sainte-Rose, where the crop is grown in conditions of almost complete shade, the former fungus was frequently associated with *Phytophthora* '*jatrophae*' [**33**, p. 183]. There are, therefore, 2 different diseases known as 'black rot' in Réunion, which are sometimes associated, one caused by *P.* '*jatrophae*' and the other by *G. vanillae* in association with *B. vanillae*.

The disease can affect any part of the stem, which at first retains its turgidity, and may infect its whole length. In very wet years the aerial roots (balais) are often attacked. The disease is occasionally confused by growers with the root rot caused by *Fusarium batatis* var. *vanillae* [cf. **33**, p. 590].

Black rot is favoured by the presence of wounds on the lianas, excessive humidity, and lack of air, factors that should be countered as far as possible. Chemical control is feasible only in special cases, and is limited by its effect on the final product. Where vanilla is grown between lines of sugarcane, the leaves of the latter should be cut at intervals to prevent them from lacerating the vanilla plants.

Fifth Annual Report of the West African Institute for Oil Palm Research, 1956–1957.—132 pp., 2 col. plans, 1957. 2*s*. 6*d*.

In the Plant Nutrition section (pp. 95–105) of this report [cf. **36**, p. 468] R. A. Bull notes the expected completion of the plant nutrition unit by the end of 1957. He states that in the Mg fertilizer trial at Calabar, Nigeria, clear evidence was obtained that orange frond symptoms [**36**, p. 402] are worsening in the control plots and beginning to reappear in the others, in which applications of $MgSO_4$ in 1953 and 1954 produced almost complete recovery. The yields from the fertilized plots continued to rise in spite of the reappearance of symptoms of Mg deficiency.

In the Mbawsi fertilizer experiment spear chlorosis appeared to be most marked in oil palms receiving P or K and least obvious in those which had not received K or which had received Mg. Orange frond was most severe in plots given K, and it is now apparent that at Mbawsi applying K fertilizers or mixtures containing K leads to Mg deficiency. In plots treated with K the orange spot-orange frond complex [loc. cit.] has almost completely disappeared. The symptoms appear to be due to a combined K and Mg deficiency, but K deficiency is the primary factor, since application of Mg in the absence of K has no effect on incidence or severity. When K is applied without Mg the complex is replaced by orange frond only. When K and Mg are applied together the complex is almost eliminated, orange frond remains slight, and orange spot is reduced. Tip and edge burn appear to be associated primarily with K deficiency.

The incidence of little leaf [cf. **32**, p. 620] does not appear to be affected by the presence or absence of B supplements. The condition is most marked at the close of the wet season, but disappears almost entirely from March–May. The duration of an attack varies, but averages about 4 months, during which 10–12 abnormal leaves are produced. After a severe attack a delay, less marked if the attack has been brief, ensues before the production of normal leaves. Symptom development is generally at a maximum 3 months after the spear has rotted, but there may be a delay of up to 4 months between the rotting of the spear and the emergence of the first abnormal leaves.

The symptoms in oil-palm seedlings grown in washed river sand without N, P, K, Mg, Ca, and S are described.

In the Plant Pathology section (pp. 105–112) J. S. Robertson states that surveys have shown approx. 20% of seedlings to be killed by blast [**37**, p. 104]; bunch refuse incorporated in the soil and mulching both significantly increased incidence. *Rhizoctonia lamellifera* and a *Pythium* (probably *P. splendens*) were consistently isolated from roots with primary infections. The presence of the *Pythium* was demonstrated in newly infected roots by placing small pieces in a muslin bag, washing in running water for 24 hr., cutting into smaller pieces, and placing in dishes containing sterile water, when the *Pythium* grew out and produced typical sporangia. Oospore formation did not occur in culture on potato dextrose agar or nutrient agar.

In experiments in which a large inoculum of *R. lamellifera* was used blast leaf symptoms developed only once, the most prevalent leaf symptom being a black wither-tip. When the *Pythium* was used blast leaf symptoms did not usually develop either, but the seedlings developed a general wilt. When the inoculum consisted of both fungi, a cortical root rot more extensive than that produced by either alone resulted, but typical leaf symptoms did not invariably develop. No evidence was obtained of toxin production by either fungus. The toxin responsible for the blast leaf symptom may be produced by a secondary organism associated with the disease in natural conditions. Surveys indicated that blasted seedlings occur in groups.

In a small trial to investigate the toxicity levels of B, Al, Zn, Mn, and Cu and their effect on *R. lamellifera* seedlings were given 3 1 l. applications of solutions

of Al sulphate (0·25%), Mn sulphate (0·25), Zn sulphate (0·5), boric acid (1), and Cu sulphate (0·25). There were no significant differences between the treated and the control plots, except that the boric acid produced severe toxicity symptoms.

The information on freckle (*Cercospora* [*elaeidis*]) has been noticed [**37**, p. 299]. A *Cercospora* apparently morphologically identical with that causing freckle was isolated from necrotic spot [cf. **36**, p. 100].

All attempts to isolate the fungus associated with crusty spot [**36**, p. 469] failed. Another form of the disease, producing a different leaf symptom, has been observed.

PARK (D.). **The saprophytic status of Fusarium oxysporum Schl. causing vascular wilt of Oil Palm.**—*Ann. Bot., Lond.*, N.S., **22**, 85, pp. 19–35, 1958.

At the Dept of Cryptogamic Botany, University of Manchester, samples of soils from the Belgian Congo and Nigeria were tested for the presence of *F. oxysporum* [**36**, p. 586], responsible for wilt of oil palms, by means of Warcup's plating method [**37**, p. 147] and a droplet plating method, sometimes in conjunction with a baiting technique. The droplet method, adapted from Curry's method for slow-growing fungi (*Brit. J. Derm.*, **61**, pp. 54–58, 1949), involved the inoculation of drops of 3% malt agar in Petri dish lids with particles of soil or plant debris. The fungus, a soil inhabiter [**37**, p. 146], was found in soil from wilt-free areas of plantations as well as in soil near wilt-diseased palms. It survived in naturally infested and in inoculated alien soils for at least 1 year.

BROADBENT (L.), HEATHCOTE (G. D.), MCDERMOTT (N[ORA]), & TAYLOR (C. E.). **The effect of date of planting and of harvesting Potatoes on virus infection and on yield.**—*Ann. appl. Biol.*, **45**, 4, pp. 603–622, 6 graphs, 1957.

Experiments conducted during 1953–56 at the University of Nottingham School of Agriculture, Sutton Bonington, Leicestershire, in which King Edward potatoes were planted each month from Apr.–Aug. and the tubers lifted after 12 weeks' growth or after the haulms had died, showed that the multiplication and flying of aphids (*Myzus persicae* and *Macrosiphum solanifolii* [*M. euphorbiae*]) were influenced by weather and varied greatly from year to year. The incidence of virus diseases (leaf roll and rugose mosaic form of virus Y) in the tubers was not related to the maximum aphid populations on the plants. Most plants were infected by aphids flying from diseased potato plants in the same field, and plots planted late did not escape. Crops planted in mid-Apr. and harvested in early July gave the fewest virus-infected tubers.

Planting in Apr. and lifting at the end of the season produced the greatest number of ware-sized tubers. When crops were lifted after 12 weeks more ware was obtained from May or June plantings than from the Apr. Few or no ware-sized tubers were produced by July or Aug. plantings and the yields of seed-size tubers from such plantings were also low. Most seed-size tubers were produced by the late-lifted May or June plantings. The date of lifting had little effect on the total number of tubers, but the date of planting affected it greatly. Most tubers were generally set by the May plantings and the number decreased with successive plantings. Tubers affected by blight [*Phytophthora infestans*] occurred only in the July or Aug. plantings.

The yield of plants infected by leaf roll virus was reduced by about three-quarters, whether the seed had been lifted early or late the year before. Mature seed, whether healthy or virus-infected, gave a bigger crop the next year than immature seed obtained by early lifting or late planting; in Britain the decrease in virus infection obtained by early lifting is quite inadequate to offset the disadvantages of such a practice, which is uneconomic.

Kozłowska (Aniela). **Wpływ czynników klimatycznych na rozwój chorób wirusowych Ziemniaka.** [The influence of climate on the development of virus diseases in Potatoes.]—*Roczn. Nauk. rol.*, **78**, Ser. D., pp. 7–143, 19 fig., 63 graphs, 4 maps, 1957. [Russian and English summaries.]

After reviewing the effect of climate on virus diseases of potatoes in different parts of the world the author presents a detailed account of the reaction to potato viruses of varieties transferred from Pomerania [**37**, p. 302] (where an ideal environment for the crop exists) to southern Poland in the region of Cracow, where the rainfall in May–Sept. is somewhat higher, and to Zakopane in the Tatz mountains where it is higher still. There were 3 types of hybrid: European varieties crossed with *Solanum andigenum*, with *S. demissum*, and a small group derived from European varieties alone.

A rhythm was observed in the development of the virus diseases depending on the reaction of the plant to the increase of virus protein in the tissues and on the climate, the latter being evident from the difference in the intensity of the diseases in potatoes derived from the same hybrids. Years of heavy rainfall were favourable for potato cultivation in the plains, near Cracow, whereas in the mountains high humidity and lack of sun reduced yield. Virus Y symptoms were characteristic of all cultures in Cracow; latent infection by X and Y in Zakopane. In both areas a reduction in virus X was observed over the years. Virus S [str. of potato para-crinkle virus] was detected serologically at Cracow.

Stocks from Zakopane carrying latent infection by viruses X and Y gave increased yields in the first years of transfer to the Cracow district. In the second year the crop was poorer but slightly better than that of plants cultivated continuously in Cracow or Zakopane, but in the following 3 years the diseases developed strongly and caused complete degeneration of the plants. In general, hot, dry years in Cracow, which intensified degeneration of crops cultivated in the vicinity, were favourable for stocks transferred from higher altitudes.

Nienhaus (F.). **Untersuchungen über den Einfluß von Temperatur und Licht auf die Empfänglichkeit der Pflanzen für das Kartoffel-Y-Virus.** [Studies on the influence of temperature and light on the susceptibility of plants to Potato virus Y.]—*Phytopath. Z.*, **30**, 2, pp. 189–224, 1 fig., 1 diag., 7 graphs, 1957. [English summary. 59 refs.]

This expanded, fully tabulated report and comprehensive discussion from the Institut für Pflanzenkrankheiten, University of Bonn, contains information supplementary to that already noticed [**35**, p. 785]. Whereas light was largely without effect at high and low temperatures, it exerted a powerful influence round about 20° C. For example, pre-inoculation periods of darkness of or exceeding 24 hr. enhanced the susceptibility of *Physalis florida* to potato virus Y by 100%. On the other hand, it was substantially reduced by interruptions of 1 hr., 15 min., or (to a lesser extent) 5 min. in 12- or 6-hr. periods of darkness. Susceptibility was greatly increased by exposure for 1 hr. to radiations of 400–500 A.

The inhibitory effect on the virus of admixtures of sap from healthy tobacco, *P. floridana*, and Erdgold was counteracted by 10 min. heating at 70–80°. After centrifugation for 1 hr. at 15,000, 25,000, and 40,000 r.p.m. the inhibitor remained in the supernatant liquid.

Storing the sap of *P. floridana* plants for 72 hr. in daylight at 20° reduced the number of lesions on the same host by 44% compared with the number from material kept in darkness.

Sprau (F.). **Ein neues Färbeverfahren für Kallose und die Überprüfung seiner Anwendung zur Diagnose blattrollkranker Kartoffeln.** [A new staining procedure for callose and the examination of its application to the diagnosis of

leaf roll diseased Potatoes.]—*NachrBl. dtsch. PflSchDienst* (*Braunschweig*), *Stuttgart*, **10**, 1, pp. 3–6, 1 fig., 1 graph, 1958.

At the Bayerische Landesanstalt für Pflanzenbau und Pflanzenschutz, Munich, a fluorescent stain, separable by chemical means or electrophoresis from Wasserblau 6 B extra (Bayer), clearly and rapidly revealed callose formation in potato tubers infected by leaf roll virus, and was better than the commonly used stain [**34**, p. 747] in revealing initial callose formation in primary infections. However, in view of the expense of fluorescence microscopy and the difficulty of preparation this stain is not recommended for general use.

Morgan (G. C.) & Peters (E. H.). **The Potato wart disease problem in Newfoundland.**—*Rep. Quebec Soc. Prot. Pl., 1956*, pp. 62–68, 1957. [23 refs. Received Jan. 1958.]

In this semi-popular review of potato wart disease (*Synchytrium endobioticum*) [cf. **34**, p. 629], it is stated that sufficient land free from wart is available in the west of Newfoundland for the production of approved seed.

Aebi (H.). **La lutte dirigée contre le mildiou de la Pomme de terre. Traitements collectifs. Expériences des années 1955 et 1956.** [The control directed against Potato blight. Co-operative treatments. Experiments in the years 1955 and 1956.]—*Schweiz. landw. Mh.*, **35**, 1–2, pp. 63–75, 5 fig., 2 graphs, 1957.

The results obtained in these co-operative spraying trials against potato blight (*Phytophthora infestans*) [cf. **36**, pp. 268, 377] in the commune of Bretigny sur Morrens, Switzerland, showed the method to have promise. The parts played in successful treatment by the time and method of application of the sprays, by the assessment of Cu deposits on the leaves by the colorimetric method, and by the destruction of the haulms are reviewed.

In one trial with 2% Bordeaux mixture 50% destruction of the total leaf surface was delayed for 18 days, in spite of the immediate proximity of untreated plots. The increase in yield was 400 kg./ha./day for 18 days, which is highly economic, provided the co-operative treatment is well organized.

Black (W.) & Gallegly (M. E.). **Screening of Solanum species for resistance to physiologic races of Phytophthora infestans.**—*Amer. Potato J.*, **34**, 10, pp. 273–281, 1957.

At the Scottish Plant Breeding Station, Edinburgh [cf. **36**, p. 661], and the Dept of Plant Pathology, W. Virginia University, Morgantown [cf. **36**, p. 269], a large number of accessions of *S. demissum* and other *S.* spp. from the Commonwealth Potato Collection, Cambridge, England, and the Potato Introduction Station, Sturgeon Bay, Wisconsin, U.S.A., were examined for resistance to 5 races of *P. infestans*. The results, which are fully tabulated, indicated the presence of one or more unidentified R genes [see below] in addition to the 4 at present recognized. Field resistance, defined as including all forms of inherent resistance except the hypersensitivity determined by the R genes, was present at various levels in the different accessions and was attributed to a polygenic mechanism. Very high levels of polygenic resistance were encountered, masking the segregation for R genes.

There were 25 accessions of *S. demissum*, and also 3 other *S.* spp. in which all individuals were resistant to the 5 races. In addition there were also highly resistant accessions of 7 other *S.* spp.

Toxopeus (H. J.). **On the influence of extra R-genes on the resistance of the Potato to the corresponding P-races of Phytophthora infestans.**—*Euphytica*, **6**, 2, pp. 106–110, 1957.

Simplex and multiplex seedling clones, bred at the Institute of Agricultural Plant

Breeding, Wageningen, Netherlands, the parentage of which is presented in detail, were grown in the field to ascertain whether the presence of additional R_3 genes led to an increase of resistance to a p_3 strain (race 3) of *P. infestans*. It was concluded that such an influence could be small only, not exceeding small differences in the average degree of field resistance existing between the groups of simplex, duplex, and triplex plants.

Takase (N.). **An additional report on the difference in phenotypic expressions between genes, R_1 and R_4, controlling resistance to Phytophthora infestans in Potatoes.**—*Euphytica*, **6**, 2, pp. 189–192, 1 pl., 1957.

Following studies at the Hokkaido National Agricultural Experiment Station, Sapporo, the author confirms that his gene Rb, which confers resistance to Japanese race H_2 [cf. **37**, p. 178] of *P. infestans*, is identical with Black's gene R_4 [**33**, p. 251].

Gaertner (A.). **Versuche zur künstlichen Kultur der Phytophthora infestans de Bary.** [Experiments on the artificial culture of *Phytophthora infestans* de Bary.] —*Zbl. Bakt.*, Abt. 2, **111**, 1–5, pp. 121–122, 1958.

A method developed at the Institut für Pflanzenpathologie, University of Göttingen, Germany, for the culture of *P. infestans* [**37**, p. 53] involved the substitution for potato stems [**35**, p. 220] of autoclaved intact tubers and of Taylor's silica gel (*J. gen. Microbiol.*, **4**, pp. 235–237, 1950) for agar in the synthetic medium. Sporangia were produced in abundance and luxuriant growth with a daily increment of 7–10 mm. diam. After 40 subcultures sporangia were still fully infective in tests on potato disks.

It is stated in a footnote that zoospores also germinated freely and produced mycelia under these conditions.

Robinson (D. B.), Larson (R. H.), & Walker (J. C.). **Verticillium wilt of Potato in relation to symptoms, epidemiology and variability of the pathogen.**—*Res. Bull. Wis. agric. Exp. Sta.* 202, 49 pp., 17 fig., 1957.

In further experiments at the Dept of Plant Pathology, University of Wisconsin [**36**, p. 430], isolates of *Verticillium* from potato in widely scattered localities in the U.S.A. and Canada were of 2 distinct types [**37**, p. 186], one with dark resting mycelium (DM), the only type isolated in Wisconsin and eastern Canada, and the other pseudosclerotial (PS), which included all isolates from Idaho and Oregon. The DM types had lower temperature maxima for growth and pathogenicity, and were generally more pathogenic than the PS on potato and tomato [loc. cit.], the latter being more pathogenic on Russet Burbank potato. Mixed inocula could be separated into the two components. Attempts to change the pathogenicity of a monospore culture of each by serial passage through hosts were unsuccessful. In monospore analysis [**36**, p. 712] the bulk of the lines obtained resembled the 'wild' parent but there were white forms common to both types. Some white forms reverted to normal when grown on potato plugs or media containing catechol: those which did not were non-pathogenic to Irish Cobbler. Cultural appearance varied widely with the medium, temperature, and pH. Mutants obtained by ultraviolet irradiation usually resembled the parent in forming dark mycelium or pseudosclerotia: there was no change of one type to the other. On account of these consistent differences it is considered that the PS type should be designated *V. dahliae* and the DM *V. albo-atrum* [cf. **10**, p. 758; **36**, p. 270].

Washing tubers of an infected stock in running water or treating them in semesan bel greatly reduced the severity of wilt in the field. Soil infestation by a DM type isolate was virtually eliminated within 3 years by either of 2 rotations (2 years Sebago potatoes, 1 year grain, 1 year clover or 1 year each potato, grain, clover, and clover hay), infected tubers being planted in the first year of each series.

Resistant potato varieties were frequently invaded by either species without apparent adverse effect: *V. albo-atrum* progressed steadily through the plant during the growing season and in the susceptible var. Kennebec it continued its advance through the tubers during winter storage. Stem streaking and tuber lesions (brown eye) were associated with *Verticillium* wilt, the former being encountered only in Irish Cobbler and Sebago, where it resulted from extensive permeation of the plants by the pathogen under conditions of high soil moisture and fertility. The extent of brown eye was correlated with wilt incidence and there was evidence that *Pseudomonas* spp. were responsible.

Brook (M.) & Chesters (C. G. C.). **The use of tetrachloronitrobenzene isomers on Potatoes.**—*Ann. appl. Biol.*, **45**, 4, pp. 623–634, 1 pl., 1 graph, 1957.

In field experiments at the University of Nottingham during 1952–55, tecnazene [**34**, p. 470] and the 2:3:4:5 isomer of TCNB (both at rates up to 5% in talc) gave good control of dry rot (*Fusarium caeruleum*) [**36**, p. 603; **37**, p. 210] on 5 varieties of potatoes, but did not give commercial control on Doon Star. Artificial inoculation experiments suggested that to achieve control the isomers had to be present at the time of infection. As 2:3:4:5 TCNB is not a sprout depressant, it would appear to merit further trial as a fungicidal treatment for seed potatoes. It is usual to re-clamp the ware tubers after screening out the seed, and these often suffer heavy losses from dry rot. Tecnazene would be of the greatest value for these potatoes, as its sprout-depressant properties would be an advantage, but for the treatment of seed only, or mixed seed and ware, the 2:3:4:5 isomer is better.

Bua (G.). **Prove sulla trasmissibilità della Rhizoctonia solani K. (Nota preliminare).** [Tests of the transmissibility of *Rhizoctonia solani* K. (Preliminary note).]—*Ric. fitop. Campan.*, **13–14**, pp. 69–75, 1 pl., 1957. [English summary.]

As imported seed potatoes are sometimes severely infected by *R.* [*Corticium*] *solani* the author carried out experiments to determine how they affected the production of tubers and the transmission of the disease [**36**, p. 612]. The planting of healthy and infected tubers (bearing sclerotia) of var. Oberarnbacher Frühe (Santa Lucia) in infested and non-infested sites in Sicily, S. and N.E. Italy, and near the Austrian border indicated that development and transmission depend on temp. favourable to the parasite and on abundant moisture. Seasonal conditions were not conducive to infection in the first 3 areas tested, and in general the fungus has a less important effect on production in the dry south than in the wetter north of Italy.

Verneau (R.). **Nuove matrici dello Sclerotium bataticola (Macrophomina phaseolina).** [New hosts of *Sclerotium bataticola* (*Macrophomina phaseolina*).]—*Ric. fitop. Campan.*, **13–14**, pp. 119–124, 1 fig., 1957. [20 refs. English summary.]

The isolation of *M. phaseolina* [*M. phaseoli*: **37**, p. 339] from tomato plants near Naples and from potato stems, roots, stolons, and tubers in the province of Caserta in 1957 constitutes new host records for Italy. Heavy losses were caused to the potatoes, which were growing in a fine soil. It is considered that in both cases weather and soil conditions favoured the fungus. The ground had not been cultivated before.

MacLachlan (D. S.) & Sutton (M. D.). **The use of antibiotics in the control of Potato ring rot.**—*Rep. Quebec Soc. Prot. Pl., 1956*, pp. 76–82, 1957. [Received Jan. 1958.]

Tests at the Botany and Plant Pathology Laboratory, Ottawa, having indicated that several antibiotics were able to kill the potato ring rot organism (*Corynebacterium sepedonicum*) [cf. **36**, p. 662; **37**, p. 107], preliminary field trials were made

with the most active, used as a tuber soak. The most promising was terramycin, which can be absorbed by actively growing potato plants through the roots and translocated to the growing point in 24 hr., the concentration there reaching a max. within 48 hr. Terramycin was not recovered consistently from basal or middle parts, indicating rapid translocation to the growing point. Other tests indicated that terramycin moves down one branch and up to the tip of the adjoining branch. When, however, sap from the base of the stems was assayed terramycin was not found.

Murant (A. F.) & Wood (R. K. S.). **Factors affecting the pathogenicity of bacteria to Potato tubers. I. II.**—*Ann. appl. Biol.*, **45**, 4, pp. 635–649; 650–663, 9 graphs, 1957.

Continuing previous studies [cf. **36**, p. 458], the authors found that *Erwinia aroideae* caused much more rotting of inoculated potato tubers than did isolates of *Pseudomonas* sp. (probably *P. marginalis*) [cf. **37**, p. 262], *Flavobacterium* sp., or *P. syringae* (the 3 last named being regarded as non-pathogenic); filtrates from potato extract cultures had about equal macerating activity. *P.* sp. and *P. syringae*, but not *E. aroideae* or *F.* sp., were agglutinated in 3 different types of potato extract at the normal pH of potato tubers.

In undisturbed potato sap *E. aroideae* made much more growth in 12 hr. than *F.* sp. or *P. syringae* and also grew more rapidly than *P.* sp., but the difference here was largely due to a longer lag phase. Both *P.* species grew much less rapidly in potato sap cultures shaken hourly than when undisturbed, whereas *E. aroideae* grew somewhat more rapidly. Measured by the total count method *F.* sp. grew better undisturbed, but measured turbidimetrically the opposite held. With a small inoculum, growth of *E. aroideae* and of *P.* sp. was delayed for 3 days in potato sap sterilized by heat, but not with an inoculum 20 times as large, with potato extract, or with sap sterilized by filtration.

The macerating activity of potato sap cultures of *P. syringae* 3 days old was low. Filtrates of *F.* sp. were more active, but much less so than those of *E. aroideae* and *P.* sp. Allowance being made for differences in growth rate, *P.* sp. secreted macerating enzymes into filtered potato sap more slowly than did *E. aroideae* during the early stages of growth. The optimum pH for the macerating enzymes of *E. aroideae* produced in potato sap was near to 6 and for *P.* sp. 7·5. This is of possible significance in invasion by *E. aroideae*, since the pH of potato tuber surface tissue is about 6·2. Little difference was found in the toxicity of preparations of similar macerating activity made from cultures of the four organisms, but the differences between the organisms *in vitro* could, if they occurred *in vivo*, partly account for differences in pathogenicity.

In the 2nd paper it is shown that differences in the amount of rotting of tubers of different varieties by *E. aroideae* could not be related to differences in the rates of suberization of the outer cells or of periderm development. The addition of growth-regulators affecting the rate of healing at the sound surface had no effect on rotting when these materials were added to inocula of *E. aroideae* or *P.* sp.

The non-pathogens, especially *P.* sp., could be made to attack tubers. Their cell-free culture filtrates consistently caused more rotting of normal tubers than did those of *E. aroideae*, though they had about equal macerating activity on tuber disks. Soaking in water [loc. cit.] had little effect on rotting by *E. aroideae*, but slightly reduced that caused by its culture filtrates; soaking increased rotting by the non-pathogens and, to a smaller degree, by their culture filtrates. Injection of water largely increased rotting by all organisms and culture filtrates. Apparently, increased water content affected the non-pathogens themselves rather than their macerating enzymes. Sealing tubers with a thin film of vaseline reduced the rate of surface healing of the inoculation cavities and increased the period during which

the surface remained moist. These and possibly other effects permitted *P.* sp. to attack tubers, though there was evidence that the reduced aeration in sealed tubers would have reduced bacterial growth.

Rotting by *E. aroideae*, but not by *P.* sp., was increased by keeping the tubers in a saturated atmosphere. Only the 2 *P.* spp. caused appreciable rotting at 5° C. Allowing the surfaces of inoculation cavities to heal for 1–4 days before inoculation reduced the number and size of active rots caused by *E. aroideae*, but delaying inoculation for 1 day did not affect rotting by its cell-free filtrates or those of *P.* sp.

The evidence obtained indicates that following inoculation normal, subturgid potato tissue absorbs the liquid of the inoculum within 3–6 hr., during which *E. aroideae* is growing and secreting macerating enzymes to rot the tissues. These are killed and the protoplasts release their contents, producing an environment where the bacterium can grow without being desiccated as long as the enzymes are produced fast enough. Bacteria such as *P.* sp., however, which produce macerating enzymes slowly, cannot rot the tissue surface fast enough to escape desiccation, a condition also induced by any delay due to a suberin barrier. Apparently, the differences between the pathogenic and non-pathogenic bacteria are not very great, and relatively small alterations in the environment round the wound surface suffice to render organisms such as *P.* sp. quite active pathogens.

Sheffield (F[rances] M. L.). **Virus diseases of Sweet Potato in East Africa. II. Transmission to alternative hosts.**—*Phytopathology*, **48**, 1, pp. 1–6, 5 fig., 1958.

This further study [cf. **37**, p. 110] sets out in detail data already noticed [**37**, p. 6]. All attempts to transmit virus B to members of the Chenopodiaceae, Compositae, Euphorbiaceae, and Malvaceae failed. In *Gomphrena globosa* the virus was confined to local lesions. It appears to be different from all other sweet potato viruses and from all known viruses transmitted by white flies (*Bemisia tabaci*).

Boneta García (E.), González Ríos (P.), & Adsuar (J.). **Prevalence of mosaic and chlorotic streak diseases in the Sugarcane of Puerto Rico.**—*J. Agric. Univ. P.R.*, **41**, 3, pp. 202–206, 1957. [Spanish summary.]

A survey disclosed that sugarcane mosaic virus [**34**, p. 399] was abundant in the E.-central and S.E. part of Puerto Rico. This is attributed to the increase in cultivation of the very susceptible var. B. 34104, the eradication of which has not been complete. The areas now completely free from the disease were those most severely affected in 1918. Chlorotic streak virus disease [**35**, p. 548] is more abundant in the northern rainy regions of the island.

Rafay (S. A.). **Ratoon stunting disease.**—*News Lett. Indian Inst. Sug. Cane Res.*, **3**, 10, 2 pp., 1957.

Since suspected symptoms of this virus disease on Co. S. 510 were reported by a visitor to Uttar Pradesh in 1956 [cf. **36**, p. 213], the slight discoloration at the nodes of this variety and also of Co. 738 has proved not to be transmissible, nor has stunting been observed in Co. S. 510. Confirmation of the presence of the disease in India is therefore still lacking.

Antoine (R.). **A staining technique for detecting ratoon stunting disease in Sugar Cane.**—*Nature, Lond.*, **181**, 4604, pp. 276–277, 1958.

At the Sugar Industry Research Institute, Réduit, Mauritius, 2,3,5-triphenyl tetrazolium chloride [**35**, p. 583] was used to detect ratoon stunting virus in sugarcane; it is reduced to the insoluble red formazan more rapidly in virus-infected than in healthy tissue. Six 0·5 mm. sections from 1 cm. plugs taken immediately above the level of the leaf trace bundles, found by experience to give the best results, were placed in a 0·5% sol. of the stain under carefully controlled conditions

at 35° C. in darkness (as the dye is light sensitive). The formazan is extracted by hot acetone and its optical density estimated by a Lumetron colorimeter. The first 4 basal nodes of mature canes gave the best difference in colour intensity between healthy and diseased cane. The reaction is observable after 2 hr. but is most evident after 9 hr., though still very marked at 20 hr.

SARMAH (K. C.). **Plant Pathology Branch—Mycological section.**—*Rep. Tocklai exp. Sta., 1956*, pp. 107–123, [1957].

This report [cf. **36**, p. 556] mentions that for the experimental control of black rot [*Corticium theae* and *C. invisum*] of tea the 5 fungicides tested (all containing 50% Cu) were used at 0·25% (1 lb./40 gal. water). The treatments all gave significant control. With perenox and coppesan a spreader made no difference.

Inoculation with *Botrytis* conidia of the tea flower disease (Sclerotiniaceae) [*Botryotinia theae* and *Ciboria theae*: loc. cit.] from cultures did not affect flower fertilization or fruit setting.

In shoots from bushes known to be affected by black rot in the past the fungus was found to be just starting regrowth in early Apr. 1956. It would appear that given suitable conditions for development it would reach the lowest leaf on the shoot by about the middle of Apr. when prophylactic spraying begins. At the same time fructifications of red rust (*Cephaleuros parasiticus*) [*C. mycoidea*: **34**, p. 822], not yet sporulating, were noticed in several places, but only on tea which had not been treated the previous year.

A severe attack of pink disease (*Corticium salmonicolor*) on 2-year-old *Crotalaria anagyroides* was noticed in the region of Golaghat. Young tea plants growing underneath it were unaffected.

LIMASSET (P.). **Le virus de la mosaïque du Tabac et l'origine de la vie.** [Tobacco mosaic virus and the origin of life.]—*Cah. Étud. biol.*, **3**, pp. 9–21, 1957. [19 refs.]

After an historical introduction, the author discusses some of the properties of tobacco mosaic virus, its multiplication, and the views that have been put forward as to its origin.

MARCELLI (E.). **Una rapida tecnica per lo studio al microscopio elettronico del virus del mosaico del Tabacco.** [A rapid method for the study by the electronic microscope of Tobacco mosaic virus.]—*Ric. fitop. Campan.*, **13–14**, pp. 101–105, 1 pl., 1 fig., 1957. [English summary.]

The method is based on that of Johnson [cf. **30**, p. 403], pressure being exerted on the stem of the plant by means of specially devised apparatus to cause the emission of drops of fluid from the veins of the cut leaves.

Studies on the Tobacco stunt disease.—*Bull. Hatano Tob. Exp. Sta.* 40, 80 pp., 19 pl. (3 col.), 3 diag., 1 graph, 1956. [Received Jan. 1958.]

This bulletin contains 11 papers on a virus disease of tobacco in Japan referred to as 'stunt' [cf. **17**, p. 629; **27**, p. 201]. Z. HIDAKA and K. NAKANO (pp. 1–12) describe the preliminary work done by a research party formed in 1949. The first record of the condition goes back to 1931 when 180 seedbeds were almost completely destroyed. The work was carried out in the Takehara District (Kamo-gun, Hiroshima Prefecture), where the disease had been frequently reported. The data obtained showed that it is a soil-borne disease of seedbeds; it may be controlled almost completely by steam-sterilizing the soil.

Z. HIDAKA (pp. 13–17) states that in the Hatano District, Kanagawa Prefecture, the damage caused by the disease in 1949 was estimated to have reduced the value of the crop by 10·17%. As a result of steam sterilization this figure was reduced to

2·72% in 1950 and to almost zero in 1951. The figure for 1950 represents a gain over 1949 of 2·39 million yen; that for 1951, one of 5·88 million yen.

Z. Hidaka (pp. 19–23) reports that when the plants are about 40 days old the veinlets clear, this symptom being followed by necrosis. A pattern of linked rings is often present. The young leaves are crinkled, deformed, rolled downwards, and mottled. A specific necrotic banding occurs in the stem at ground level and there is a ring-like brownish necrosis in the vascular bundles. The whole plant is stunted and rosetted. Transmission was possible only by grafting. From the sap of an affected plant the author obtained a purified sediment of a brownish colour by ultracentrifuge fractionation. Under the electron microscope the material contained uniform, spherical particles about 18 mμ diam.

Z. Hidaka and T. Uozumi (pp. 25–29) demonstrated that in affected seedbeds the surface soil, the subsoil, and fallen leaves (used as soil heating material) were all infested. Of these materials the fallen leaves are used again the following year and so carry over the disease.

Z. Hidaka, T. Uozumi, and T. Shimizu (pp. 31–35) state that the virus retained full pathogenicity for at least 4 years in soil stored in or out of doors. Sun-drying for 15 days did not reduce the infectivity of infested soil but hot-water treatment at 55–60° C. for 20 min. checked the disease.

Z. Hidaka and T. Uozumi (pp. 37–46) report that a 2 cm. layer of infested soil on the surface caused a high percentage of infection but layers below 2 cm. produced none. The greater the distance of plants from diseased soil the less was the incidence of infection. The disease occurred even in infested soil diluted 127 times its vol. with sterilized soil.

Z. Hidaka, T. Uozumi, and C. Hiruki (pp. 47–52) grew 28 tobacco vars. in infested soil; typical symptoms developed on Bright Yellow, Delcrest, Judy's Pride, Gold Dollar, KY 16, Kelley, RK 70, and Vamorr 50, all with high percentages of infection. No symptoms developed on 10 Japanese vars., 12 spp. of *Nicotiana* other than *N. tabacum*, or on tomato, eggplant, or petunia. Symptoms developed up to the 4th or 5th leaf, including the cotyledons, but not beyond.

Z. Hidaka and C. Hiruki (pp. 53–60) describe experiments which demonstrated that after fractionation of infested soil each fraction, floating, in suspension, or deposited, retained the same infectivity as the whole. A soil suspension after filtration through a 300-mesh sieve remained as infective as before. As the suspension gradually settled its infectivity decreased. Infested soil remained infectious after 64 days of continuous immersion in water. No difference in infectiveness was noted when infested soil was treated with O_2 for 20 days and CO_2 for 40, or when treated with O_2 and CO_2 for 10 days alternately during a period of 40 days.

Z. Hidaka, C. Hiruki, and R. Uozumi (pp. 61–66) report that when infested soil was treated with carbolic acid, $HgCl_2$, formalin, ruberon, chloropicrin, CS_2, DD, or $CuSO_4$ either no disease developed or not more than 10% of the seedlings planted in it became affected. Ceresan, uspulun, and xylol were less effective. Insecticides were without effect.

Z. Hidaka and C. Hiruki (pp. 67–73) report that in an air-conditioned glasshouse symptoms began to develop on the 35th day after tobacco was sown at 17°, but they did not appear at 25° in 30 days, though some of the plants were infected; with 25° and 17° on alternate days symptoms developed. A plant kept at 17° for 30 days and then at 25° for 30 days after sowing developed no symptoms, but when again exposed to 17° symptoms developed.

Z. Hidaka (pp. 75–80) obtained the most effective sterilization of infested seedbed soil with steam sterilization at 90° for 10 min. Of the chemicals tested, chloropicrin gave better results than DD or ethylene bromide but this depended on a number of factors and was not reliable. If diseased plants occurred in the sterilized soil they were in small groups and easily separated.

Waggoner (P. E.) & Taylor (G. S.). **Dissemination by atmospheric turbulence: spores of Peronospora tabacina.**—*Phytopathology*, **48**, 1, pp. 46–51, 4 diag., 1958.

This is a more detailed presentation from the Connecticut Agricultural Experiment Station, New Haven, of data already noticed [**36**, p. 357]. It is deduced that if spores are assumed to be dispersed according to the statistical theory of turbulence [cf. **37**, p. 10], with variances in the horizontal directions of $\frac{X^{7/4}}{2}$ and in the vertical direction of $\frac{2X^{7/4}}{9}$, where X is the distance downwind, then the lesions must disseminate a max. of about 10^5 spores/day. The conclusions are applicable to the forecasting of the disease and the timing of dusting for control.

Apparently the spores are discharged as the sporophore shrivels in the morning, but not while it is shrivelled or as it is wetted in the evening [**21**, p. 498]. Forcible discharge is necessary for dispersal; turbulence alone is not enough.

Marcelli (E.). **Un marciume del piede del Tabacco in semenzaio e in campo causato da Phytophthora sp.** [A foot rot of Tobacco in seedbed and field caused by *Phytophthora* sp.]—*Ric. fitop. Campan.*, **13–14**, pp. 125–159, 3 pl., 1957. [90 refs. English summary.]

A full account is presented of the author's study of a foot rot of tobacco near Pontecagnano, Italy, caused by a fungus which differed from *P. parasitica* var. *nicotianae* in its lesser pathogenicity; it is identified provisionally as *P. palmivora*, not previously recorded on tobacco in Italy.

Marcelli (E.). **Notizie preliminari di un attacco tardivo su Tabacco presumibilmente da Cercospora nicotianae Ell. e Ev.** [Preliminary notes on a late attack on Tobacco, presumably by *Cercospora nicotianae* Ell. & Ev.]—*Ric. fitop. Campan.*, **13–14**, pp. 77–85, 1 pl., 1957. [English summary.]

A brief account in semi-popular terms of leaf spot (*C. nicotianae*) of tobacco [cf. **27**, p. 201]. An outbreak, apparently of this disease, affected mature plants of the Herzegovina and Virginia Bright varieties after a very wet period at the end of the summer of 1956 in Italy.

Marcelli (E.). **Un nuovo prodotto per la lotta contro l'oidio del Tabacco: il karathane. Prime esperienze di lotta in serra ed in campo.** [A new product for the control of powdery mildew of Tobacco: karathane. First experiments on control in glasshouse and field.]—*Tabacco, Roma*, **61**, 684, pp. 262–269, 1 fig., 1957. [English summary.]

In a greenhouse test at the Istituto Scientifico Sperimentale per i Tabacchi, Scafati, Italy, Virginia Bright tobacco plants growing under optimum conditions for the development of powdery mildew [*Erysiphe cichoracearum*: **36**, p. 732] were sprayed once (3 days after being brought into the greenhouse) with karathane, the controls being given shirlan (25% salicylanilide) at 0·8%. At 0·06% karathane gave better control than shirlan, keeping the plants unaffected for 2 weeks; at 0·12 and 0·18% it did so for 3 weeks. These results were confirmed by field trials with karathane powder (0·06%) and emulsion (0·05%). It is suggested that the product should be used at between 0·06 and 0·12%. Treatment did not appear to impair the taste or aroma of the product.

Marcelli (E.). **Una interessante manifestazione di 'frenching' in concomitanza di alterazioni da carenza potassica su Tabacco.** [An interesting manifestation of 'frenching' in association with symptoms of potassium deficiency in

Tobacco.]—*Ric. fitop. Campan.*, **13–14**, pp. 107–117, 1 col. pl., 2 fig., 1957. [English summary.]

Virginia Bright tobacco plants in the province of Udine, Italy, developed frenching, together with symptoms of K deficiency [cf. **30**, p. 83]. Soil applications of K caused the deficiency symptoms to disappear and markedly reduced frenching. Stable manure also largely reduced frenching, though not as much as K; mixtures of N, P, K had a similar effect.

WHARTON (D. C.). **Tomato mineral metabolism and respiration as affected by two strains of Tobacco mosaic virus.**—*Diss. Abstr.*, **17**, 2, pp. 222–223, 1957.

In an investigation at Pennsylvania State University tomato plants in greenhouse sand culture were inoculated with a strain of tobacco mosaic virus [**36**, p. 621] which induces a yellow mottle and an isolate from tomato fruits with internal browning, which produced a slight green mottle, the virus titre being determined by local lesion assay on *Nicotiana glutinosa*.

A direct correlation was found between increased rates of respiration and the amount of virus being produced. There were decreases in the amounts of Ca and Zn in the tops of all infected plants and a significant increase in Mn in those infected by the yellow strain.

VERONA (O.) & TREGGI (G.). **Una non comune virosi del Pomodoro.** [An uncommon virosis of Tomato.]—*Ann. Sper. agr.*, N.S., **11**, 6, Suppl., pp. lxxvii–lxxxi, 2 pl., 1957. [English summary.]

In the summer of 1956 Tripolino or Livornese tomatoes growing in a glasshouse near S. Frediano, Pisa, Italy, developed very large, irregularly shaped leaves with a conspicuous, markedly distorted midrib. In some leaves one lateral half was reduced to a ribbon, while the other side was much larger than normal. The blades bore protuberances and were deeply wrinkled, formations somewhat resembling enations being present. The leaves were heavy, rigid, and brittle, and eventually bore round or elliptical necrotic spots. Only a few small, wrinkled fruits formed, and these had a thick skin and an insipid flesh. X-bodies were found in some of the cells. Inoculations of Kentucky tobacco seedlings gave rise to chlorotic areas on the inoculated leaves. The condition is considered to have been caused by *Nicotiana* virus 1A [strain of tobacco mosaic virus: **36**, p. 752].

SELMAN (I. W.) & PEGG (G. F.). **An analysis of the growth response of young Tomato plants to infection by Verticillium albo-atrum.**—*Ann. appl. Biol.*, **45**, 4, pp. 674–681, 7 graphs, 1957.

At Wye College, University of London, root inoculation of Potentate tomato seedlings with *Verticillium albo-atrum* [**36**, p. 430] checked growth but did not immediately cause yellowing of the leaves. Local wilting occurred in some plants 2 weeks after the check; 8 weeks after inoculation the dry weights of leaf, stem, and root were reduced by, respectively, 72, 70, and 65%. Leaf area was less owing to the failure of the leaves to expand, but neither water nor N appeared to be contributory limiting factors. The water content of infected leaves was not reduced until 6 weeks after inoculation, by which time yellowing and necrosis had also appeared. The percentage N contents of stem, root, and leaf of infected plants were more than those of healthy 24 days after inoculation, N uptake not being seriously impaired until 21 days later; photosynthetic activity was reduced, mean net assimilation rates being 0·47 (healthy) and 0·39 (diseased) g./dm^2/week.

TAYLOR (G. A.) & SMITH (C. B.). **The use of plant analysis in the study of blossom-end rot of Tomato.**—*Proc. Amer. Soc. hort. Sci.*, **70**, pp. 341–349, 1957.

In 2 greenhouse sand culture studies at Pennsylvania State University, University

Park, there was a significant increase in the incidence of blossom-end rot [cf. **36**, p. 793 and below] in Rutgers tomato plants at high N levels. Susceptible plants were significantly lower in Ca [loc. cit.] and higher in total N, Fe, and Cu than non-susceptible. Ca content of fruit was in good agreement with the critical value of 0·2% proposed by Raleigh and Chucka [**24**, p. 209]. The evidence obtained suggested that terminal leaf samples would provide a more sensitive index of Ca status than would either basal leaves or fruit. There were highly significant differences in Ca content in different parts of tomato fruits; the direction of the gradient favours the appearance of rot symptoms at the apex.

Taylor (G. A.). **The influence of some environmental and nutritional factors on the incidence of internal-browning of Tomato.**—*Diss. Abstr.*, **17**, 2, pp. 211–212, 1957.

In soil and sand experiments at Pennsylvania State University yield records from 1 experiment showed a highly significant difference in the incidence of internal browning [**34**, p. 406] in plants receiving infrequent watering (1·2% affected fruit) and those given heavy watering and mist (24·2%), the latter containing 92 μg. B/g. dry weight, compared with 37 μg. where incidence was negligible.

In another experiment the disorder was confined to plants given low N (100 p.p.m.). At low N and low B (0·02 p.p.m.) incidence was 22%, while with low N and high B (2 p.p.m.) it was only 5·5%. Translocation of reducing sugar was related to both N and B nutrition.

High N produced an average of 60% fruit with blossom-end rot [see above], owing to Ca deficiency, in contrast to less than 5% in the low N treatment.

Panfilova (Mme T. S.). Роль видов **Cytospora** в усыхании древесных насаждений Узбекистана. [The role of *Cytospora* spp. in the wilting of tree plantations in Uzbekistan.]—Тр. Плод.-ягод. ин-та АН Уз. С.С.Р. [*Trud. Berry-fruit Inst. Acad. Sci. Uz. S.S.R.*], 21, pp. 11–31, 1956. [37 refs. Abs. from *Referat. Zh. Biol.*, *1957*, 18, p. 182, 1957.]

The results of inoculation of peach, plum, cherry, apricot, apple, poplar, and willow trees with *Cytospora* spp. are described, together with the symptoms in the different hosts, the morphology of the causal agent, and the factors favourable for penetration in the wood. A detailed survey on the control of the disease is given.

Bakshi (B. K.). **Diseases of khair (Acacia catechu Willd.) and their prevention.**—*Indian For. Rec.*, N.S., *Myc.*, **1**, 7, pp. 91–96, 2 pl., 1957.

A reprint of a paper already noticed [**36**, p. 431].

Treskin (P. P.) & Podkatova (Mme M. A.). Новая болезнь Клена ясенелистного в Куйбышевской области. [A new disease on ash-leaved Maple in the Kuibishev district.]—Изв. Куйбышев. сельскохоз. ин-та. [*Bull. Kuibishev agric. Inst.*], **12**, pp. 145–152. [Abs. from *Referat. Zh. Biol.*, *1957*, 21, p. 162, 1957.]

The dying of maple trees (*Acer negundo*) in 1953 has been attributed to *Verticillium dahliae* [cf. **35**, p. 56]. The disease has spread fast and is severe in many districts. There is a certain relationship between ecological conditions and infection of saplings. The authors recommend control measures.

Pirone (P. P.). **Ganoderma lucidum, a parasite of shade trees.**—*Bull. Torrey bot. Cl.*, **84**, 6, pp. 424–428, 4 fig., 1957.

A survey was made to determine the cause of death in over 300 Norway maples (*Acer platanoides*) and some swamp maples (*A. rubrum*) growing in city streets in

New York and Atlantic Highlands, New Jersey, thought to have been affected by escaping gas. Sporophores of *G. lucidum* were present on the trunk bases or roots of nearly 20% of the dead trees, and they were also found on living trees with branches above the invaded area of trunk either dead or bearing undersized leaves.

There was a sharp line of demarcation between invaded and non-invaded tissue. Bark and sapwood chips yielded cultures of the fungus. Its ability to penetrate living tissue was demonstrated by the invasion of bark and sapwood several inches above and below the site of inoculation in 3-year saplings of *A. platanoides*. In a further experiment $\frac{1}{2}$-in. squares cut from large fresh sporophores in August were worked into the soil round the roots of 4 similar saplings in pots: 2 did not come into leaf in the following spring and the others developed sparse, undersized leaves and died before the following August. Four control plants continued to grow normally. The fungus was recovered from all the affected saplings.

Spîrchez (Z.), Silaghi (G.), & Popescu (V.). **Un atac de Laetiporus sulphureus (Fr. ex Bull.) Bond. et Sing. pe Castanul comestibil (Castanea vesca. Mill.).** [An attack of *Laetiporus sulphureus* (Fr. ex Bull.) Bond. & Sing. on the edible Chestnut (*Castanea vesca* Mill.).]—*Rev. Pădurilor*, **70**, 10, pp. 670–672, 2 fig., 1956. [23 refs.]

In 1955 chestnut trees in an Oradea plantation in Romania were attacked by *Polyporus sulphureus*, fructifications of which appeared on the trunks.

Georgescu (C. C.) & Mocanu (Victoria). **Tracheomicoza puieţilor de Stejar.** [Tracheomycosis of Oak seedlings.]—*Rev. Pădurilor*, **70**, 9, pp. 598–599, 1956. [Russian and German summaries. Received 1958. 8 refs.]

This is a new record for Romania of vascular wilt of oak seedlings caused by *Fusarium oxysporum*, also present in U.S.S.R. The disease has spread widely and is causing general wilting among seedlings. Better drainage of the soil is recommended and a preplanting disinfection of the soil in the nurseries is necessary. In the district of Ploesti *Pestalozzia truncata* has been isolated from oak trees.

Kirilenko (T. S.). Показники стійкості листя Дуба до борошнисті роси. [Indicators of Oak leaf resistance to mildew.]—Укр. Бот. Журн. [*J. Bot. Acad. Sci. Ukr.*], **14**, 3, pp. 78–83, 1957. [Russian and English summaries.]

At the Agricultural Academy, Kiev, resistant leaves of mature oaks and resistant old leaves of 1-year seedlings exhibited higher peroxidase and catalase activity than susceptible leaves, while the respiratory intensity and general oxidative activity were lower, which may be considered as signs of relative resistance to mildew (*Microsphaera alphitoides*) [**37**, p. 318].

Kobayashi (T.) & Itô (K.). **Phomopsis and its perfect stage Diaporthe causing a die-back of the Paulownia tree.**—*Bull. For. Exp. Sta. Meguro* 103, pp. 57–68, 1 pl., 3 fig., 1957. [Japanese summary.]

In studies at the Government Forest Experiment Station, Tokyo, *Diaporthe* sp. from die-back on *P. tomentosa* twigs was shown to be genetically connected with *Phomopsis* sp. occurring with it. Cultural studies enabled the two to be identified as *D. eres* and its imperfect state *Phoma imperiales*.

Inoculation experiments proved that the fungus is slightly pathogenic.

Lavitskaya (Mme Z. G.). Іржа Тополі Самаркандськоі (**Populus bolleana Layche**) в міських насадженнях півдня У.Р.С.Р. [Rust on Samarkand Poplar (*Populus bolleana* Layche) in the forests in south Uk.S.S.R.]—Наук. зап.

Київськ. ун-т. [*Sci. Ann. Univ. Kiev*], **15**, 4, pp. 101–109, 1956. [Abs. from *Referat. Zh. Biol., 1957*, 21, p. 161, 1957.]

A description is given of infection by *Melampsora* spp. on poplars of the subgenera Eupopulus and Leuce. *M. populina* on poplars and *M. tremulae* on aspen attack only the leaf blades, always producing teleutospores. *M. tremulae* on *P. bolleana* and *P. alba* destroys buds and shoots.

Gambogi (P.). **Alterazioni cromatiche in legno di Pioppo abbattuto.** [Discolorations in the wood of felled Poplar.]—*Ann. Sper. agr.*, N.S. **11**, 4, *Suppl.* pp. lxxvii–xcvi, 5 fig., 1 graph, 1957. [English summary. 33 refs.]

Examination in 1955 at the Istituto di Patologia Vegetale, University of Pisa, Italy, of sawn poplar trunks left in the forest showed that extensive blackish areas had appeared on the surface, whereas internally, near the middle, yellowish-gold patches were present. Affected material yielded *Sphaeropsis ellisii* [cf. **27**, p. 100], *Pestalotia lignorum* Gambogi sp. nov. [**36**, p. 716], *Valsa sordida* [cf. **36**, p. 674], and a sterile species, which was shown by inoculation of pieces of poplar and pine to be responsible for the yellow-golden stain; the blackish areas were caused by the other spp. All the fungi are described.

Ziller (W. G.). **Studies of western tree rusts. III. Milesia laeviuscula, a needle rust of Grand Fir.**—*Canad. J. Bot.*, **35**, 6, pp. 885–894, 2 pl., 1 diag., 1957.

Continuing his studies [cf. **35**, p. 56], the author found from observations made near Victoria, British Columbia, and inoculation experiments that *Milesia laeviuscula* (*Contrib. Arnold Arbor.*, **2**, pp. 1–138, 1932) causes a rust on the current year's needles of *Abies grandis* [cf. **13**, p. 412]. Infection was repeatedly induced on *Polypodium vulgare* var. *occidentale* and *A. grandis*. The pycnial and aecidial stages are described for the first time; the pycnia on current season needles are amber-yellow, sub-epidermal, immersed, globoid to napiform, 150–230 μ wide $\times$ 150–190 μ high; pycniospores are straight, 2·0–2·5 $\times$ 5·5–6·5 (7·5) μ; the aecidia are 0·3–0·5 mm. diam. and up to 2·5 mm. high; and the sub-globose to oblong aecidiospores 18–26 $\times$ 20–40 (44) μ. The aecidia require 4–5 months to mature, primary infection of the fern taking place largely in late autumn and early winter; the rust can survive on its fern host independently of *A. grandis*.

Davidson (A. G.). **Studies in forest pathology. XVI. Decay of Balsam Fir, Abies balsamea (L.) Mill., in the Atlantic Provinces.**—*Canad. J. Bot.*, **35**, 6, pp. 857–874, 6 graphs, 1 map, 1957.

Some of the results of these analyses of approximately 2,600 living *A. balsamea* trees growing in 7 different localities in the Atlantic Provinces of Canada have already been reported [**34**, p. 414]. After adjustment for age differences in the amount of cull existed between some of the areas. In trees 60–120 years old the effect of age is expressed chiefly in the number of decayed trees, though in some areas it also affects the amount of butt cull. Differences in the amount of trunk cull between different localities could be attributed to differences in the number of trees with this form of decay. No significant effect of age on the amount of trunk cull in infected trees was noted in any locality, and there were no differences in this figure in different localities. Differences in the amount of butt cull were due to the number of trees with butt rot and the amount of cull in infected trees.

Stereum sanguinolentum [**36**, p. 798; **37**, p. 116] was the main agent of trunk decay (93% of identifiable cultures) in all areas. Butt decay was caused by a number of fungi, the most frequent being *Corticium galactinum* (in 2 areas) and *Coniophora puteana* (in 4), followed by *Polyporus balsameus*, *Odontia bicolor*, *Armillaria mellea*, and *Poria subacida*.

OFFORD (H. R.), QUICK (C. R.), & MOSS (V. D.). **Blister rust control aided by the use of chemicals for killing Ribes.**—*J. For.*, **56**, 1, pp. 12–18, 6 fig., 1958.

An account of the eradication of *Ribes* in the U.S.A. with herbicides (2,4-D and 2,4,5-T) to control *Cronartium ribicola* on pine [cf. **37**, p. 321].

GEORGESCU (C. C.) & PETRESCU (M.). **Contribuții la studiul bolii 'Opăreala sub zăpadă a puieților de Rășinoase', produsă de Discosia pini Heald.** [Contribution to the study of the disease 'snow scald of conifer saplings', caused by *Discosia pini* Heald.]—*Rev. Pădurilor*, **70**, 1, pp. 36–38, 5 fig., 1956. [Russian summary. Received 1958.]

This disease, well known in Romania, has appeared also in nurseries on Scots pine and other conifers near Gurghiu and in the Timoșoara district. Although *Herpotrichia nigra*, *Rosellinia byssiseda* [**34**, p. 195] and *D. pini* were isolated, only the last is discussed in this paper, as it is widespread in the country and very important economically. Bordeaux mixture at 1%, sprayed on the infected parts, checked the disease.

VAARTAJA (O.). **Effects of Trichoderma on tree seedlings and their pathogens.**—*Bi-m. Progr. Rep. Div. For. Biol., Dep. Agric. Can.*, **13**, 5, p. 1, 1957.

In experiments [at the Forest Pathology Laboratory, Saskatoon], *Trichoderma* strains isolated from tree seedlings were potentially pathogenic to seedlings of *Pinus* spp., *Betula* spp., and *Caragana arborescens*, especially in weak light, and they differed in pathogenicity. Each of 11 strains reduced the growth of *Rhizoctonia* [*Corticium*] *solani* [**36**, p. 798] at a distance of several cm.; when the *T.* colonies met those of *C. solani*, they overgrew them. When seedlings of *Pinus banksiana* were grown in pots in different soils inoculated with 2 *T.* strains, the fungus appeared to increase the survival of the seedlings. When *T.* strains were inoculated on agar in jars and soil known to contain *C. solani* and *Pythium ultimum* was poured on top of the colonies and seeded with *P. banksiana* neither pathogenicity nor biological control by the *T.* strains was demonstrated. The moderately phytotoxic and strongly anti-fungal antibiotics known to be produced by *T.* may, it is concluded, accumulate only under certain conditions.

PARKER (A. K.). **The nature of the association of Europhium trinacriforme with pole blight lesions.**—*Canad. J. Bot.*, **35**, 6, pp. 845–856, 2 pl., 1957.

At the Forest Biology Laboratory, Victoria, British Columbia, *E. trinacriforme* [**36**, p. 798] was isolated from 11% of the lesions on western white pine (*Pinus monticola*) affected by pole blight [**37**, p. 321] in the interior of British Columbia (i.e. east of the coastal mountain range) and from 84% on the coast. This fungus was the only organism isolated more than twice from pole blight lesions and found to be pathogenic to white pine. It caused no pole blight, however, during the first 4 years after inoculation; wound inoculation caused lesions similar in shape to those of pole blight, and with resin exudation, but otherwise different. Radial growth analysis indicated that lesions occur after a general reduction in radial increment at the same time as or shortly after the first crown symptoms appear. Radial growth beneath the lesions was almost always less than in other parts of the stem section, indicating that the position and extent of the lesions are determined before they occur. The evidence obtained indicated that *E. trinacriforme* probably enters lesions already present and extends them, and that they are not directly caused by the fungus or any other organism.

NEWHOOK (F. J.). **Mortality of Pinus radiata in New Zealand.**—Abs. in *Proc. Canad. phytopath. Soc.*, **25**, p. 16, 1957.

In the serious wilt disease caused by *Phytophthora cinnamomi* [cf. **36**, p. 517]

which is responsible for heavy losses in *P. radiata* shelter belts in many parts of N. Island, New Zealand, groups of mature trees die rapidly in spring and early summer after abnormally wet winters, following destruction of the absorbing rootlets. The fungus was present in 25–63% of soil samples from affected hedgerows, but in only 0–6% from healthy ones. Grid sampling showed that the fungus is highly concentrated in the fibrous root zones of the trees. It is also present in some of the major pine plantations in New Zealand, while an apparently new species of *Phytophthora* has been isolated from another.

Linzon (S. N.). **Peniophora phlebioides Jackson and Dearden, a sapwood deteriorating fungus on Eastern White Pine.**—*Canad. J. Bot.*, **36**, 1, pp. 207–208, 1958.

In 1953–4 a study was made by the Laboratory of Forest Pathology, Maple, Ontario, of the fungi on felled and dead standing specimens of white pine (*Pinus strobus*). The 11 basidiomycetes encountered are listed; amongst them is *P. phlebioides* saprophytic on some of the fallen pines, a new record on this species of a fungus hitherto known only in British Columbia (*Canad. J. Res.*, Sect. C, **27**, pp. 147–156, 1949).

Etheridge (D. E.). **Moisture and temperature relations of heartwood fungi in subalpine Spruce.**—*Canad. J. Bot.*, **35**, 6, pp. 935–944, 15 graphs, 1957.

At the Forest Biology Laboratory, Calgary, Alberta, it was found that the opt. moisture content for max. development in *Picea glauca* wood blocks was higher (34–44% of saturation) for the butt-rotting fungi *Polyporus tomentosus* [**21**, p. 174; **37**, p. 191], *Flammula connissans* [**34**, p. 195], and a fungus designated 'unknown C' [loc. cit.] than for the trunk-rotting fungi *Fomes pini* [**36**, p. 798], *Stereum sanguinolentum* [**37**, p. 380], and *Peniophora septentrionalis* [cf. **36**, p. 222] (11–39% of saturation). Blocks inoculated with *Coniophora puteana* [**37**, p. 124] increased in moisture level, and this fungus may be able to regulate moisture content to its advantage, possibly by absorption of moisture by the thick mycelial strands and conduction to the wood. This species caused max. loss of wt. (about 12%) at a moisture content of 35·2% of saturation.

The max. temp. for growth on malt agar was 5° C. lower for the butt-rotting fungi (including *C. puteana*) [**36**, p. 798] than for the trunk-rotting organisms (20° and 25°, respectively). The strain of *S. sanguinolentum* used had an opt. at 25° and a max. at 30°. Three cultures of *Coryne sarcoides* [**37**, p. 191] showed a variation in temp. range correlated with their geographic origin. One from *Pinus contorta* var. *latifolia*, commonly occurring on warm, dry sites, had a growth max. at 35°, the others, from spruce, generally associated with moist, cool conditions, had narrower temperature ranges, the opt. for one being 20°.

Of the 3 trunk-rotting fungi, *P. septentrionalis* grew most rapidly on agar and also caused most decay, while *F. pini* with the slowest growth caused the least decay. A similar trend was noted for the butt-rotting fungi, growth on agar and in wood increasing from a min. for *F. connissans* to a max. for *C. puteana*. It is considered that both the moisture and temp. conditions in the trees may have much ecological importance in determining the relative dominance of fungi in certain situations.

Nobles (Mildred K.). **A rapid test for extracellular oxidase in cultures of wood-inhabiting Hymenomycetes.**—*Canad. J. Bot.*, **36**, 1, pp. 91–99, 1958.

Following a review of the use of various differential media to distinguish cultures of white rotting from brown rotting hymenomycetes, including the standard use of media with gallic or tannic acid [**17**, p. 423; **36**, p. 627], a method is described from the Canada Dept of Agric., Ottawa, by which an alcoholic solution of guaiacum is applied directly to cultures of the fungi. A rapid blueing, indicative of an

extracellular oxidase, occurs with white-rotting strains, the brown-rotting ones causing no colour change. In parallel tests on 133 spp. with this and the standard method similar results, which are tabulated, were obtained with some 90%.

Record of the 1957 Annual Convention of the British Wood Preserving Association, Cambridge, July 3rd—6th, 1957.—vii+216 pp., 16 pl., 11 fig., 10 graphs, London, British Wood Preserving Association, [1957].

This report [cf. **33**, p. 328] contains 7 papers on various aspects of timber preservation, each followed by a discussion, and concludes with a summary of these. S. A. Richardson (pp. 86–113) deals with the *in situ* treatment of building timber for the control of wood-destroying insects and fungi with reference, *inter alia*, to *Merulius lacrymans* [**36**, p. 292 *et passim*]. T. J. E. Mateus (pp. 137–170) describes a mechanical test used in Portugal for studying the effects of wood preservatives, presents some results obtained, and compares it with the loss of weight method. The technique consists in measuring the variation in rigidity of a small beam treated with the preservative under investigation and exposed to attack by the test fungus. F. F. Ross and M. Jocelyn Wood (pp. 171–206) discuss the preservation of timber in water-cooling towers [cf. **37**, p. 123, *et passim*], with special reference to factors influencing the incidence and development of soft rots, particularly those due to members of the Chaetomiaceae [cf. **35**, p. 856].

Belford (D. S.), Preston (R. D.), Cook (C. D.), & Nevard (E. H.). **Timber preservation by copper compounds.**—*Nature, Lond.*, **180**, 4595, pp. 1081–1083, 6 fig., 1957.

In this preliminary report of co-operative work at the Botany Dept, University of Leeds, and Messrs. Hickson's Timber Impregnation Co., Castleford, Yorks., $2 \times 2 \times 1$ in. test blocks of *Pseudotsuga taxifolia* [*P. menziesii*] were used. They were placed individually in beakers, weighted down, and put in a desiccator at a vacuum of 27 in. Hg for 10 min. The treatment solution, tanalith C [**34**, p. 563], was run in under the vacuum which was maintained for a further 10 min. The blocks were then soaked for 2 hr. at air pressure and dried. The depth of penetration of the Cu compounds was determined by staining sections of the treated blocks with rubeanic acid (dithio-oxamide), which formed a deep blue, insoluble Cu complex under alkaline conditions. This blue coloration was never observed in the cell lumina but the middle lamella stained very deeply and the whole cell wall stained to a certain extent, though not uniformly in any sample, indicating that the Cu was not uniformly distributed.

Under the polarizing microscope the sections were deep blue for light vibrating in a plane parallel to tracheid length and pale yellow for that at right angles to it. This dichroism changed according to the direction of the cellulose microfibrils, indicating that the copper-dithio-oxamide complex is orientated specifically with respect to them. Thus, some at least of the Cu is associated very closely with the cellulose in the cell wall.

When ultra-thin sections were examined by the electron microscope, sub-microscopic particles similar to those which appeared when a drop of tanalith C solution was evaporated to dryness were observed in the cell walls. The cellulose microfibrils of untreated wood, examined after disintegration in a blender, were free from opaque incrustations, whereas the microfibrils of treated wood had heavy incrustations of some electron-opaque material.

The characteristic electron diffraction diagrams obtained from treated wood resemble, but are not identical with, X-ray patterns of copper-alkali-cellulose II, previously described. The former were always oriented with respect to the cellulose microfibrils, and it seems likely that a proportion of the Cu occurs in the cell walls as a copper-cellulose complex.

Diffraction patterns similar to the above were given by treatments with aqueous $CuSO_4$, mixtures of $CuSO_4$ with potassium dichromate, and salts of Cr, Co, Fe, and Zn. It is concluded that in timber impregnated with salts of this type the metal component is situated within the cell wall.

It is thought that the copper-cellulose complex forms in the paracrystalline regions of the microfibrils where the cellulose chains lie approximately parallel to each other but are not regularly spaced.

WILSON (J. D.) & SLEESMAN (J. P.). **Pesticides for the control of vegetable insects and diseases.**—*Publ. Ser. Dep. Ent. Bot. Pl. Path. Ohio* 4, 12 pp., 1957.

Materials recommended against a few of the more common pests and diseases of a number of vegetable crops are listed with notes on rate, time, and method of application.

HEROLD (R.). **Zur Symptomatik und Schadwirkung des Kohlschwarzringflecken-virus.** [On the symptoms and injurious effect of Cabbage black ring spot virus.] —*Phytopath. Z.*, **31**, 2, pp. 149–157, 13 fig., 1957.

Symptoms produced in various varieties of cabbage and cauliflower by inoculation with black ring spot virus [**33**, p. 397] at the Institut für Gemüsebau und Unkrautforschung, Neuss II Land, Germany, are described. The losses in yield amount to about 20–45%.

The virus strain investigated in this study is characterized by its reactions on various test plants. On wallflower it produces light green, round leaf spots which disappear later. Clearing occurred on the subsequent leaves between the large veins, starting partly from the finer veins. On *Matthiola incana* it produced strong clearing and necrosis of the fine and finest veins of new leaves. On both hosts leaf deformation occurs frequently as well as arrested growth and broken flowers.

Numerous round, light spots with dark green centres observed on horse-radish in test-plots at the Institute, followed by inoculation to a series of test plants, indicated that in all probability infection was by the same virus; this points to the possibility of the latter overwintering on this host.

AYERS (G. W.). **Races of Plasmodiophora brassicae.**—*Canad. J. Bot.*, **35**, 6, pp. 923–932, 1957.

In studies from 1950–55 at the Plant Pathology Laboratory, Charlottetown, Prince Edward Island, 6 physiologic races of *Plasmodiophora brassicae* [cf. **31**, p. 53; **35**, pp. 158, 500, 568; **36**, p. 367] were distinguished by differences in pathogenicity on differential hosts. Crucifers found suitable for this purpose were Wilhelmsburger swede, Nappan hybrid swede lines (from Nova Scotia), Laurentian swede, *Sisymbrium altissimum*, black mustard, *Brassica campestris*, and Wisconsin clubroot-resistant cabbage lines. Reactions in swede and cabbage were sharply differential: Wilhelmsburger was resistant to all except race 1; certain Nappan hybrids were moderately resistant to race 1 and highly resistant to the others; Laurentian was resistant to races 5 and 6 only. Wisconsin cabbage was markedly resistant to races 5 and 6 and highly susceptible to 2 and 4. Races 2, 3, and 4 were distinguished by the reactions of *B. campestris* and *S. altissimum*; race 5 was separated from 6 by the greater susceptibility of mustard and *B. campestris* to the former.

These results lend support to the polygenic theory of inheritance in cabbage lines selected for resistance to clubroot in Wisconsin [cf. **34**, p. 85]. All the inocula tested caused some clubbing and, except when inocula with very high or very low pathogenicity were used, there were marked differences in the degree of clubbing on plants exposed to individual clubroot samples. The gradation in the intensity of clubbing was probably associated with the number of genes controlling resistance in individual plants.

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